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eWASA Industry Waste Management Plan

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Kindly note that this is a draft document for public stakeholder consultation.

In view of this its contents and subject matter remain under review until such time as the public consultation process is complete, and therefore the contents and layout may be altered accordingly.

GENERAL INFORMATION

This Industry Waste Management Plan (IWMP) has been prepared on behalf of the Members of Ewasa, who collectively are representative of the sector that treats electric and electronic waste.

In addition, this plan is supported by the following entities:-

- Institute of Waste Management
- Plastics SA
- National Recycling Forum
- Packaging Council of South Africa
- Responsible Packaging Management of South Africa

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Executive summary

E-waste Take-Back System Design and Policy

End-of-life (EoL) electronics have garnered significant interest among policymakers because they are a waste stream with a unique combination of characteristics. First, levels of EoL electronics, or “e-waste”, have been increasing and are expected to continue on this path. Second, e-waste contains materials that are considered toxic, such as lead, mercury and cadmium, which have led to increased environmental concern about improper disposal of these products. Third, there are valuable materials in e-waste and recovery of these materials can alleviate mining of virgin materials. For example, a metric ton of EoL personal computers contains more gold than that recovered from 17 tons of gold ore. Finally, in many cases the costs of recycling e-waste exceed the revenues generated from the recovered materials. This is primarily due to the difficulty of separating highly commingled materials in complex products.

These concerns have led policy-makers across the world to create systems to collect and process e-waste, also known as “take-back systems”. The Asian countries of Japan, Taiwan and South Korea have developed mandatory e-waste collection laws. Furthermore, the Member States of the European Union (EU) have recently completed transposing the Waste Electrical and Electronic Equipment (WEEE) Directive, which requires original equipment manufacturers (OEMs) to be responsible for the collection of EoL electronics. The European Member States join other European countries, such as Norway and Switzerland that have similar programmes.

North America has experienced a rapid increase in e-waste legislative activity within the past three years. As of September 2008, seventeen US states and four Canadian provinces had already implemented systems or approved legislation creating electronics recycling systems. Legislative activity in the US is rapidly increasing: 79 pieces of e-waste legislation were introduced in 33 states in 2007, compared with 54 bills introduced in 27 states in 2006. While it is laudable that policy-makers should resolve to address e-waste issues, they often lack the knowledge and practical experience required to create efficient new take-back systems for EoL electronics.

The current in-place systems are nascent and many were developed concurrently without the benefit of learning from existing systems. This leaves policy-makers and system architects in the unenviable position of creating systems that are essentially experimental in nature – they must use policy instruments that are new and have not been well-tested. A tangential result is that there is a patchwork of different implementations of e-waste take-back systems in many states and regions.

There is a need for a consolidated source of information on EoL electronics take-back system design that would summarize design alternatives and highlight their strengths and weaknesses. The primary objective of this voluntary Industry Waste Management Plan is to address this need by providing guidance to policymakers and system architects on the policy tools, configuration alternatives, financing schemes and management alternatives that may be used to operate such systems.

Stakeholder	Lessons from eco-efficiency studies/system implementations worldwide
Legislators	<p>Adhere to “better regulation” and “minimizing the administrative burdens” principles: For example, in the EU, 27 different transpositions and interpretations of the WEEE Directive have led to high costs, disorder, delays and lost focus on the original environmental intent.</p> <p>Increasing harmonization can improve compliance and avoid free-riding.</p> <p>Enforcement is essential to avoid free-riding, illegal exports and low quality of treatment and to create positive incentives for collection.</p>
Producers	<p>Producers have three types of responsibilities:</p> <p><i>Financially:</i> Whatever financing mechanism is applied for the collection categories with net costs, the mechanism itself should not promote doing less.</p> <p><i>Organizationally:</i> Producers are the only stakeholders with global organizing capabilities.</p> <p>More development of transnational or even global approaches should be welcomed that improve economies of scale, recycling knowledge and better collection and treatment.</p> <p><i>Product design:</i> From an eco-efficiency perspective, design should be focused on avoiding specific recycling “accidents”. It is challenging to design away net collection and recycling costs. Furthermore, it is difficult to establish a design feedback loop that includes old appliances collected (sometimes 20+ years old) and new products. All design-for-recycling-motivated product design changes should be evaluated from a life-cycle perspective to ensure that end-of-life considerations are balanced with other eco-design principles.</p>
Take Back Systems/ Compliance Schemes	<p>Develop a joint strategy and positioning towards an “Ideal WEEE Framework” based on compromise instead of debating individual issues separately. There are no one-size-fits-all solutions for all WEEE. Solutions tailor-made for different sub-sectors (IT, CE, White Goods, Lighting equipment) have completely different environmental priorities and economic models as well as incomparable breakdowns of take-back costs.</p> <p>Realize economies of scale: Educate consumers to hand in old products, make logistics efficient and aggregate treatment and auditing standards for recyclers. The introduction of market instruments that encourage positive competition for more collection should be further researched.</p>
Municipalities	<p>Maximize collection: Avoiding illegal trading and “cherry picking”. Provide easily accessible, free of charge collection points for consumers. Mandatory hand-in to compliance schemes can decrease (illegal) trading of collected goods. Furthermore, educate local consumers on easily accessible waste collection points.</p>
Retailers	<p>Maximize collection: Better retail involvement means more service to consumers with more easily accessible collection points and a direct fulfillment of producer obligations for their own-branded products. An “all-for-all” take-back mechanism should be considered: selling a product category means take-back of any type of equipment free of charge with an obligation to forward collected waste to compliance schemes.</p>
Recyclers	<p>Develop “best available” technologies and practices for the recycling sector, particularly monitoring practices for outgoing material fractions. Avoid illegal secondary trading with its associated adverse environmental effects by installing and complying with transparent substance flow monitoring and reporting.</p>
Consumers	<p>Maximize collection: Hand in old products.</p> <p>Consumers will pay in the end, regardless of whether costs are made visible or internalized.</p>

Table 1: Key stakeholder responsibilities in a take-back system

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A. DEFINITIONS

In this Integrated Industry Waste Management Plan, unless the context indicates otherwise;

“arising” means the number or mass of e-waste generated in a given period in South Africa;

“collection fee” means the fee that will be raised by eWASA for the management process of any e-waste on which no green fee has been raised;

“DEA” means the Department of Environmental Affairs

“events” means one-day collection events arranged by eWASA at which identified consumers can drop off e-waste at pre-arranged locations for collection by e-waste transporters. Events may range in frequency from one to several events, often in different locations within a province;

“green fee” means the non-commercial recovery of the costs of environmental compliance that will be collected by eWASA from the subscribing electronic and electrical equipment producers, the proceeds of which will be utilised to fund the costs of operating eWASA and the National Take Back Scheme;

“general waste” means waste, not being e-waste, generated by any person or institution;

“management process” means the course of action adopted for a category or sub-category of waste for the:

- collection of e-waste from designated venues;
- its transport to and temporary storage at transfer sites;
- its sorting and preparation for delivery;
- its delivery to e-waste processors;
- method of funding the above activities; and
- the audit of the above activities

“Minister” means the Minister of Water & Environmental Affairs;

“recovery” means the controlled extraction of a material or the retrieval of energy from e-waste;

“recycle” means the separation and processing of materials from e-waste for further use as new products or resources;

“re-use” means the utilisation of e-waste, in whole or in part, without changing the composition of the waste product;

“eWASA Industry Plan” means the Integrated Industry Waste Management Plan submitted by eWASA and approved by the Minister;

“subscriber” means any electronic and electrical equipment producer that registers with eWASA Integrated Industry Waste Management Plan:

“transfer site” means a site established by a transport contractor for the storage and preparation for onward delivery of waste collected from electronic and electrical equipment producers or from legacy waste stockpiles;

“transport contractor” means any person or institution engaged in the commercial transport, storage and preparation of e-waste for onward delivery on behalf of eWASA;

“transport sub-contractor” means any person or institution engaged in the commercial transport and storage of e-waste on behalf of a eWASA appointed transport contractor;

“e-waste” - electronic and electrical equipment waste is the term used to describe old, end-of-life or discarded appliances using electricity. "e-waste" is used as a generic term embracing all types of waste containing electrically powered components. e-Waste contains both valuable

materials as well as hazardous materials which require special handling and recycling methods;

“e-waste category” means the categories of e-waste as defined in the DEA draft Waste Categorisation System for WIS Reporting.;

01	Large Household Appliances	Washing machines, Dryers, Refrigerators, Air-conditioners, etc.
02	Small Household Appliances	Vacuum cleaners, Coffee Machines, Irons, Toasters, etc.
03	Office, Information & Communication Equipment	PCs, Laptops, Mobiles, Telephones, Fax Machines, Copiers, Printers etc.
04	Entertainment & Consumer Electronics, and Toys, Leisure, Sports & Recreational Equipment, and Automatic Issuing Machines	Televisions, VCR/DVD/CD players, Hi-Fi sets, Radios, etc., and Electric train sets, coin slot machines, treadmills etc., and Vending machines, parking ticket equipment etc.
05	Lighting Equipment	Fluorescent tubes and lamps, sodium lamps etc. (Except Incandescent Bulbs, Halogen Bulbs) etc.
06	Electric and Electronic Tools	Drills, Electric saws, Sewing Machines, Lawn Mowers etc. (Except: large stationary tools/machines) etc.
07	Security & health care equipment	Surveillance and Control Equipment (e.g. CCTV cameras, scanning equipment), and Medical Instruments and Equipment (e.g. x-ray and heart lung machines) etc.
08	Mixed WEEE	

Table 2: e-Waste categories

“dealer” means any person or entity that distributes, or otherwise deals commercially in electronic and electrical equipment;

“producer” means a person or institution engaged in the commercial manufacture or import of electronic and electrical equipment in South Africa;

“equipment sales” means the number of electronic and electrical equipment sold, donated, replaced under warranty, provided part of a promotional campaign, rejected as having a factory fault, or otherwise distributed in South Africa by a producer;

“e-waste management” means the collection and transport, the storage and preparation for delivery, the delivery of e-waste, the funding and the control of these operations;

“e-waste processor” means any person or entity that is engaged in the commercial re-use, recycling or recovery of e-waste.

B. INTRODUCTION

1. PREAMBLE

- 1.1. In response to the National Waste Management Strategy the eWaste Association of South Africa (eWASA) has prepared this voluntary Integrated Industry Waste Industry Management Plan.

2. OBJECTIVES

- 2.1. The primary objective of the eWASA is to operate, on behalf of its subscribers, an organisation that will administrate the sustainable collection of the annual arising of electronic and electrical waste (e-waste) in the Republic of South Africa and to make them available to waste processors authorised in terms of relevant South African legislation.
- 2.2. The secondary objective is to promote the creation of a healthy waste processing industry with subsequent job creation

3. TAKE BACK SCHEME STRUCTURE

A take-back system has three main functions, **collection, processing and system management**. These designations refer to specific goals of the programmes and all viable systems comprehend all of these functions. The financing scheme encompasses all of the functions and enables the system to be executed. A system architect must define implementation modes for these four components, which will depend on the goals of the system.

Some common goals for e-waste systems include:

- Motivate OEMs to improve product recyclability, reduce the use of toxic materials and integrate these concepts into product design.
- Prevent toxic materials from entering landfills or being incinerated.
- Recover scrap materials from the products, thereby avoiding the environmental burdens associated with producing virgin materials.
- Ensure that e-waste is processed in an environmentally and socially responsible manner.
- Share responsibility among stakeholders.
- Motivate consumers to hand in equipment.
- Create an efficient and sustainable system.

A fundamental challenge in creating any system is balancing potentially conflicting goals to try and create an optimal system.

4. Third Party Organizations

The management of take-back schemes may be carried out by a third party organization (TPO), which provides the management and administration of a recycling programme for its members. The TPOs membership may be made up entirely of manufacturers of the products being recycled, but it can include government entities and other members such as recyclers or collectors.

Alternatively, it may be a single entity created by the government to manage a system. Activities carried out by TPOs, or compliance schemes, vary from country to country, depending on specific legislation requirements, but also depend on services offered to members. In addition to organizing take-back activities, some TPOs provide legal or consultancy services on related topics or compliance services for other flows of waste like packaging or batteries.

The way TPOs manage day-to-day operations depends on:

- Number of other (competing) TPOs in the country: When many TPOs are responsible for collection and treatment of discarded electronics, especially if the same categories of products at collection facilities are managed, a coordination issue needs to be addressed.
- Coordination mechanisms between TPOs: Different approaches could be established, varying from split of territory of the country, a central coordination system that allocates pick-up from collection points depending on relative market share of TPOs or other algorithms, or pure competition, leaving substantial problems related to cherry picking effects and proper coverage of territory. There are two different approaches TPOs may take that accomplish different objectives: own-branded TPOs and non-own-branded TPOs.

Sometimes the creation of TPOs is considered as implementation of a “collective approach”, in contrast to an individual approach. It should be noted that the degree of collectiveness can be separated into two different levels: the operational level and the financial level. The discussion on how to achieve individual financial responsibility even in a collective operational approach introduces a further complexity element.

(i) Own-branded

The aim of an own-branded TPO is to collect and treat members' products only. This is in line with the principle of Individual Producer Responsibility (IPR), as a member of the TPO has direct control over its discarded products on the operational level. When the methods for allocating financial responsibility correspond to the return share of products per brand, the IPR principle is fully achieved.

(ii) Non-own-branded

The aim of a non-own-branded TPO is to collect and treat products irrespective of the brand of members and arising waste. A non-own-branded TPO could be seen as the implementation of a "collective approach" as no relationship exists between members and products collected and treated by the TPO. The TPO could process a share of arising e-waste, depending on the number of other TPOs established in the country, and allocate financial responsibilities among members according to different models (i.e., unit-based, weight based, fixed % on sales, etc.). Non-own-branded TPOs are the large majority of those established around the world, as even TPOs established by a group of OEMs are nowadays not only collecting products of their members but rather a share of e-waste arising in the countries where active.

5. Original Equipment Manufacturers

Some producers have established individual product stewardship programmes. Under such scenarios two different options exist:

- (i) A product recovery network, which includes its own recycling infrastructure and refurbishment or recycling programmes to process own appliances. The OEM has full control over operations and a direct involvement in the entire process.
- (ii) Service providers are contracted in order to collect and treat the OEM's proprietary discarded appliances. The level of engagement of the OEM is determined by the contractual agreement and can vary from full oversight of the process to insignificant engagement in how the contracted operations are performed. The OEM individually responsible approach is more common for commercially owned and leased (B2B) products that are quite often refurbished or taken back to recover components or spare parts. The two options presented under this scenario can be easily distinguished as the level of involvement of OEMs is quite different. The second option described is more common than the first one.

6. Financing Schemes

Financing of downstream e-waste activities and allocation of economic responsibilities along the downstream chain has proven to be challenging in countries with existing take-back schemes and in countries discussing potential take-back system architectures. The way Stakeholders financially contribute to different activities varies and many models exist. From a general perspective, there are three main stakeholders who could bear responsibility for end-of-life electronics products:

- **The entire society.** As e-waste is a societal problem, having impact not only on consumers but also on the entire population (both in terms of environmental and societal impacts), systems could be financed by the entire society (i.e., by taxpayers), especially when government organizations keep control over operations.
- **The consumers.** This could be seen as an implementation of the "polluter pays principle", where the polluter is recognized as the person responsible for discarding an end-of-life appliance. It could also be argued that even though a producer may bear financial responsibility, consumers will eventually pay the end-of-life costs as an increase of the product price, even when no up-front external charges are paid at point of sale.
- **The producers.** This is implementation of various degrees of the extended producer responsibility principle. It should be noted that although the financing of systems is ensured by producers, internalization of costs in the product price can arise by means of:
 - A reduction of the producer's sales margins, resulting in the financial impact fully borne by the producer, or
 - An increase of sales price, resulting in the financial impact indirectly borne by the consumer.

The choice between a reduction of sales margins or an increase in sales price is not strictly dependent on the financing model of the entire system, even if advocates of EPR speak primarily of cost internalization as a reduction in margins – notwithstanding different costs and margins

structures for different products exist. Such choice involves many complex issues and depends on each company's strategy and product portfolio. The definition of financing models is critical to understanding the design and operation of e-waste take-back systems and is necessary to clearly assess many basic principles of the financial management of compliance schemes. Furthermore definitions are necessary in order to:

- Assess the financial flows (this issue is related to the financial responsibility of stakeholders and, in particular, of producers and final users. It is also related to the assignment of responsibility based on various metrics - i.e., put on market by weight, unit or value, or by return shares, etc.).
- Assess the impact on stakeholders and compliance with legislative requirements.
- Assess the economic and financial effectiveness of any compliance scheme in comparison with itself and with others over time.

The relationships among the stakeholders involved in a system and the financial flows are specified by financing models. Based on the differences in the operative and financial structures of systems in place around the world, it's possible to define at least four generic financing models. These models identify the relationship between stakeholders (i.e., between producers, compliance scheme and final users) and the level of responsibility of the system managers:-

- **Compliance Cost**
In a Compliance Cost model, producers finance activities in the system, bearing costs for management of all e-waste (for example, by joining a compliance scheme, financing their own take-back system or product stewardship programme).
- **Reimbursed Compliance Cost**
In a Reimbursed Compliance Cost model, producers finance activities in the system by bearing costs for management of e-waste (for example, by joining a compliance scheme or financing their own take-back or product stewardship programme).
- **Compliance Cost & Visible Fee**
In a Compliance Cost and Visible Fee model, producers finance activities in the system, bearing costs for management of waste they put on the market (for example, by joining a compliance scheme or financing their own take-back system).
- **Recycling Fee**
A Recycling Fee, also known as a Recovery Fee, is paid by consumers when they buy new equipment.
- **End-of-Life Fee**
An end-of-life fee is paid by generators of e-waste (i.e., the last owner of a product who decides to recycle it) to an entity who assumes responsibility for recycling the EoL product. The fee covers collection and recycling costs.

C. BACKGROUND

eWASA has voluntarily developed this IndWMP in response to the draft National Waste Management Strategy (NWMS) that has been drafted, gazetted and released for public comment, as prescribed by the National Environmental Management: Waste Act, 2008 (Act no. 59 of 2008, on behalf of its members who are active in the electronic and electrical goods industry.

Sections 3.4.2 Voluntary IndWMPs; 3.4.7 Current and future IndWMPs and 4.9 eWaste of the draft NWMS refers.

The NWMS has identified WEEE or e-waste as a waste category that could be a challenge. This plan will describe how the electronic and electrical goods industry plans to manage this waste stream effectively.

e-Waste or WEEE is a term used to cover almost all types of electrical and electronic equipment that has or could enter the waste stream. Although e-waste is a general term, it can be often considered to cover TV's, computers, mobile phones, white goods (fridges, washing machines, dryers etc.), home entertainment and stereo systems, toys, toasters, kettles – almost any household or business item with circuitry or electrical components with power or battery supply.

While some e-waste can be hazardous the waste also contains valuable and rare metals, such as gold, palladium and indium. Recovery of these metals should be encouraged in a world economy where resource scarcity is a major concern. A recent UNEP report by an independent panel of scientists highlighted the need to recover these metals. The report is available online at http://www.unep.org/metalstocks/documents/pdf/MetalStocksInSocietyScienceSynth_full_en.pdf

A well-developed formal PC refurbishing industry exists and thrives in the country and forms part of a sensible re-use solution to extend the life of equipment before it becomes waste. Many refurbishers import second-hand goods to be sold into our market. As most of this equipment is returned to refurbishers at end-of-life it can then be put into the responsible e-waste management system that exists.

eWASA has been working with e-waste collectors, dismantlers and recyclers since the first project work was done on e-waste in 2002. The industry has grown and formal recycling has expanded with five dismantling/recycling companies now accredited according to the Technical Guidelines on the recycling of electrical and electronic equipment. These Guidelines were developed during 2009 with the assistance of the Swiss e-waste programme, local and international experts.

Valuable Materials in e-waste

The following table presents the composition of a desktop computer plus a [CRT](#) screen in 1996. More than 80% of the weight consists of silica (glass), plastics, iron and aluminium. Precious and scarce materials account for only a small percentage of the total weight. Nevertheless, the concentration of such metals, e.g. gold, is higher in a desktop computer than found in naturally occurring mineral ore.

Composition of a Desktop Personal Computer Based on a typical desktop computer, weighing ~27 kg

Material name	Content (% of total weight)	Weight of material in computer (kg)	Use	Location
Plastics	22.9907	6.26	Insulation	Cable, Housing
Lead	6.2988	1.72	Metal joining	Funnel glass in CRTs, http://www.pwbrc.org/faq10.cfm >PWB
Aluminum	14.1723	3.86	Structural, Conductivity	Housing, CRT, PWB, connectors
Germanium	0.0016	< 0.1	Semiconductor	PWBs
Gallium	0.0013	< 0.1	Semiconductor	PWBs
Iron	20.4712	5.58	Structural, Magnetivity	Housing, CRTs, PWBs
Tin	1.0078	0.27	Metal joining	PWBs, CRTs
Copper	6.9287	1.91	Conductivity	CRTs, PWBs, connectors
Barium	0.0315	< 0.1	Å	Panel glass in CRTs
Nickel	0.8503	0.23	Structural, Magnetivity	Housing, CRT, PWB
Zinc	2.2046	0.6	Battery, Phosphor emitter	PWB, CRT
Tantalum	0.0157	< 0.1	Capacitor	Capacitors/PWB, power supply
Indium	0.0016	< 0.1	Transistor, rectifier	PWB
Vanadium	0.0002	< 0.1	Red Phosphor emitter	CRT
Terbium	0	0	Green phosphor activator, dopant	CRT, PWB
Beryllium	0.0157	< 0.1	Thermal Conductivity	PWB, connectors

Gold	0.0016	< 0.1	Connectivity, Conductivity	Connectivity, conductivity/PWB, connectors
Europium	0.0002	< 0.1	Phosphor activator	PWB
Titanium	0.0157	< 0.1	Pigment, alloying agent	Housing
Ruthenium	0.0016	< 0.1	Resistive circuit	PWB
Cobalt	0.0157	< 0.1	Structural, Magnetivity	Housing, CRT, PWB
Palladium	0.0003	< 0.1	Connectivity, Conductivity	PWB, connectors
Manganese	0.0315	< 0.1	Structural, Magnetivity	Housing, CRT, PWB
Silver	0.0189	< 0.1	Conductivity	Conductivity/PWB, connectors
Antimony	0.0094	< 0.1	Diodes	Housing, PWB, CRT
Bismuth	0.0063	< 0.1	Wetting agent in thick film	PWB
Chromium	0.0063	< 0.1	Decorative, Hardner	Housing
Cadmium	0.0094	< 0.1	Battery, blue-green Phosphor emitter	Housing, PWB, CRT
Selenium	0.0016	0.00044	Rectifiers	rectifiers/PWB
Niobium	0.0002	< 0.1	Welding	Housing
Yttrium	0.0002	< 0.1	Red Phosphor emitter	CRT
Rhodium	0	Â	Thick film conductor	PWB
Platinum	0	Â	Thick film conductor	PWB
Mercury	0.0022	< 0.1	Batteries, switches	Housing, PWB
Arsenic	0.0013	< 0.1	Doping agent in transistors	PWB
Silica	24.8803	6.8	Glass, solid state devices	CRT,PWB

Source: *Microelectronics and Computer Technology Corporation (MCC). 1996. Electronics Industry Environmental Roadmap. Austin, TX: MCC.*

Table 3: *Composition of a Desktop Personal Computer*

Possible health impacts of e-waste recycling

Direct impacts on human health may be caused by:

- Dust in indoor air generated in manual and mechanical dismantling processes (e.g. when processing plastics or [Cathode Ray Tubes](#) (CRTs) found in old TVs and Computer screens);
- Filter dust generated in the mechanical dismantling process;
- Noise emissions during the manual and mechanical dismantling process (conveyor belts, hammering, shredders etc.);
- Deviations from occupational safety standards;

Indirect impacts on human health may be caused by:

- Air pollution related to (HT) incineration (however the situation has been very much improved since waste gas purification systems are a common standard);
- Emissions due to transportation of materials;
- Contamination of water systems and soil near landfills.

The indirect impacts on human health are difficult to quantify, among others because of synergistic effects and the time-lag between exposure and reaction.

Hazardous substances found in some e-waste

Substance	Occurrence in e-waste	Health effects
Halogenated compounds:		
- PCBs (polychlorinated biphenyls)	Condensers, Transformers	PCBs are a class of organic compounds use in a variety of applications, including dielectric fluids for capacitors and transformers, heat transfer fluids and as additives in adhesives and plastics. PCBs have been shown to cause cancer in animals. PCBs have also been shown to cause a number of serious non-cancer health effects in animals, including effects on the immune system, reproductive system, nervous system, endocrine system and other health effects. PCBs are persistent contaminants in the environment. Due to the high lipid solubility and slow metabolism rate of these chemicals, PCBs accumulate in the fat-rich tissues of almost all organisms (bioaccumulation). The use of PCBs is prohibited in OECD countries, however, due to its wide use in the past, it still can be found in waste electrical and electronic equipment as well as in some other wastes.
- TBBA (tetrabromo-bisphenol-A) - http://www.atsdr.cdc.gov/tfacts68.html ">PBB (polybrominated biphenyls) - PBDE (polybrominated diphenyl ethers)	Fire retardants for plastics (thermoplastic components, cable insulation) TBBA is presently the most widely used flame retardant in printed wiring boards and casings.	The three main types of BFRS used in electronic and electrical appliances are Polybrominated biphenyl (PBB), Polybrominated diphenyl ether (PBDE) and Tetrabromobisphenol - A (TBBPA). Flame retardants make materials, especially plastics and textiles, more flame resistant. They have been found in indoor dust and air through migration and evaporation from plastics. Combustion of halogenated case material and printed wiring boards at lower temperatures releases toxic emissions including dioxins which can lead to severe hormonal disorders. Major electronic manufacturers have begun to phase out brominated flame retardants because of their toxicity.
- Chlorofluorocarbon (CFC)	Cooling unit, Insulation foam	Chlorofluorocarbons are compounds composed of carbon, fluorine, chlorine, and sometimes hydrogen. Used mainly in cooling units and insulation foam, they have been phased out because when released into the atmosphere, they accumulate in the stratosphere and have a deleterious effect on the ozone layer. This

Substance	Occurrence in e-waste	Health effects
		results in increased incidence of skin cancer in humans and in genetic damage in many organisms. For more information go to http://www.c-f-c.com/supportdocs/cfcs.htm
- PVC (polyvinyl chloride)	Cable insulation	Polyvinyl chloride (PVC) is the most widely-used plastic, used in everyday electronics and appliances, household items, pipes, upholstery etc. PVC is hazardous because contains up to 56 percent chlorine which when burned produces large quantities of hydrogen chloride gas, which combines with water to form hydrochloric acid and is dangerous because when inhaled, leads to respiratory problems.
Heavy metals and other metals:		
- Arsenic	Small quantities in the form of gallium arsenide within light emitting diodes	Arsenic is a poisonous metallic element which is present in dust and soluble substances. Chronic exposure to arsenic can lead to various diseases of the skin and decrease nerve conduction velocity. Chronic exposure to arsenic can also cause lung cancer and can often be fatal.
- Barium	Getters in CRTs	Barium is a metallic element that is used in sparkplugs, fluorescent lamps and "getters" in vacuum tubes. Being highly unstable in the pure form, it forms poisonous oxides when in contact with air. Short-term exposure to barium could lead to brain swelling, muscle weakness, damage to the heart, liver and spleen. Animal studies reveal increased blood pressure and changes in the heart from ingesting barium over a long period of time. The long-term effects of chronic barium exposure to human beings are still not known due to lack of data on the effects.
- Beryllium	Power supply boxes which contain silicon controlled rectifiers and x-ray lenses	Beryllium has recently been classified as a human carcinogen because exposure to it can cause lung cancer. The primary health concern is inhalation of beryllium dust, fume or mist. Workers who are constantly exposed to beryllium, even in small amounts, and who become sensitized to it can develop what is known as Chronic Beryllium Disease (beryllicosis), a disease which primarily affects the lungs. Exposure to beryllium also causes a form of skin disease that is characterized by poor wound healing and wart-like bumps. Studies have shown that people can still develop beryllium diseases even many years following the last exposure.
- Cadmium	Rechargeable NiCd-batteries, fluorescent layer (CRT screens), printer inks and toners, photocopying-machines (printer	Cadmium components may have serious impacts on the kidneys. Cadmium is adsorbed through respiration but is also taken up with food. Due to the long half-life in the body, cadmium can easily be accumulated in amounts that cause

Substance	Occurrence in e-waste	Health effects
	drums)	<p>symptoms of poisoning. Cadmium shows a danger of cumulative effects in the environment due to its acute and chronic toxicity. Acute exposure to cadmium fumes causes flu-like symptoms of weakness, fever, headache, chills, sweating and muscular pain. The primary health risks of long term exposure are lung cancer and kidney damage. Cadmium also is believed to cause pulmonary emphysema and bone disease (osteomalacia and osteoporosis). For more information on go to: http://www.intox.org/databank/documents/chemical/cadmium/ehc135.htm</p>
- Chromium VI	Data tapes, floppy-disks	<p>Chromium and its oxides are widely used because of their high conductivity and anti corrosive properties. While some forms of chromium are non toxic, Chromium (VI) is easily absorbed in the human body and can produce various toxic effects within cells. Most chromium (VI) compounds are irritating to eyes, skin and mucous membranes. Chronic exposure to chromium (VI) compounds can cause permanent eye injury, unless properly treated. Chromium VI may also cause DNA damage. For more information, go to http://www.intox.org/databank/documents/chemical/chromium/ehc61.htm</p>
- Lead	CRT screens, batteries, printed wiring boards	<p>Lead is the fifth most widely used metal after iron, aluminum, copper and zinc. It is commonly used in the electrical and electronics industry in solder, lead-acid batteries, electronic components, cable sheathing, in the glass of CRTs etc. Short-term exposure to high levels of lead can cause vomiting, diarrhea, convulsions, coma or even death. Other symptoms are appetite loss, abdominal pain, constipation, fatigue, sleeplessness, irritability and headache. Continued excessive exposure, as in an industrial setting, can affect the kidneys. It is particularly dangerous for young children because it can damage nervous connections and cause blood and brain disorders. For more information go to http://www.hc-sc.gc.ca/english/iyh/environment/lead.html and http://www.intox.org/databank/documents/chemical/lead/ukpid25.htm.</p>
- Lithium	Li-batteries	<p><i>Chemical dangers:</i> Heating may cause violent combustion or explosion. The substance may spontaneously ignite on contact with air when finely dispersed. Upon heating, toxic fumes are formed. Reacts violently with strong oxidants, acids and many compounds (hydrocarbons, halogens, halons, concrete, sand and asbestos) causing fire and explosion</p>

Substance	Occurrence in e-waste	Health effects
		<p>hazard. Reacts violently with water, forming highly flammable hydrogen gas and corrosive fumes of lithium hydroxide. Read more: http://www.lenntech.com/Periodic-chart-elements/li-en.htm#ixzz0LnNiT4YC</p> <p><i>Effects of short-term exposure:</i> The substance is corrosive to the eyes, the skin and the respiratory tract. Corrosive on ingestion. Inhalation of the substance may cause lung oedema. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation is therefore essential. Immediate administration of an appropriate spray, by a doctor or a person authorized by him/her, should be considered. Read more: http://www.lenntech.com/Periodic-chart-elements/li-en.htm#ixzz0LnNiSxV6</p>
- Mercury	Fluorescent lamps that provide backlighting in LCDs, in some alkaline batteries and mercury wetted switches, Compact Florescent Lamps (CFLs) and Florescent tubes	<p>Mercury is one of the most toxic yet widely used metals in the production of electrical and electronic applications. It is a toxic heavy metal that bioaccumulates causing brain and liver damage if ingested or inhaled. In electronics and electrical appliances, mercury is highly concentrated in batteries, some switches and thermostats, and fluorescent lamps. For more information go to http://www.intox.org/databank/documents/chemical/mercury/cie322.htm</p>
- Nickel	Rechargeable NiCd-batteries or NiMH-batteries, electron gun in CRT	<p>An uptake of too large quantities of nickel has the following consequences:</p> <ul style="list-style-type: none"> - Higher chances of development of lung cancer, nose cancer, larynx cancer and prostate cancer - Sickness and dizziness after exposure to nickel gas - Lung embolism - Respiratory failure - Birth defects - Asthma and chronic bronchitis - Allergic reactions such as skin rashes, mainly from jewellery - Heart disorders <p>Nickel fumes are respiratory irritants and may cause pneumonitis. Exposure to nickel and its compounds may result in the development of a dermatitis known as "nickel itch" in sensitized individuals. The first symptom is usually itching, which occurs up to 7 days before skin eruption occurs. The primary skin eruption is erythematous, or follicular, which may be followed by skin ulceration. Nickel sensitivity, once acquired, appears to persist indefinitely. Read more:</p>

Substance	Occurrence in e-waste	Health effects
		http://www.lenntech.com/Periodic-chart-elements/Ni-en.htm#ixzz0LnO7z0QT
- Rare Earth elements (Yttrium, Europium)	Fluorescent layer (CRT-screen)	<p>The toxicity of europium compounds has not been fully investigated, but there are no clear indications that europium is highly toxic compared to other heavy metals. The metal dust presents a fire and explosion hazard.</p> <p>Water soluble compounds of yttrium are considered mildly toxic, while its insoluble compounds are non-toxic.^[40] In experiments on animals, yttrium and its compounds caused lung and liver damage, though toxicity varies with different yttrium compounds. In rats, inhalation of yttrium citrate caused pulmonary edema and dyspnea, while inhalation of yttrium chloride caused liver edema, pleural effusions, and pulmonary hyperemia.^[6] Exposure to yttrium compounds in humans may cause lung disease.^[6] Workers exposed to airborne yttrium europium vanadate dust experienced mild eye, skin, and upper respiratory tract irritation—though this may have been caused by the vanadium content rather than the yttrium.^[6] Acute exposure to yttrium compounds can cause shortness of breath, coughing, chest pain, and cyanosis.^[6] NIOSH recommends a time-weighted average limit of 1 mg/m³ and an IDLH of 500 mg/m³.^[65] Yttrium dust is flammable.^[6]</p>
- Selenium	Older photocopying-machines (photo drums)	Exposure to high concentrations of selenium compounds cause selenosis. The major signs of selenosis are hair loss, nail brittleness, and neurological abnormalities (such as numbness and other odd sensations in the extremities). Source: Information collated from http://www.atsdr.cdc.gov/toxfaq.html
- Zinc sulphide	Interior of CRT screens, mixed with rare earth metals	
Others:		
- Toner Dust	Toner cartridges for laser printers / copiers	
Radio-active substances - Americium	Medical equipment, fire detectors, active sensing element in smoke detectors	<p>The radiation from exposure to americium is the primary cause of health effects from absorbed americium. Americium moves rapidly through the body after uptake and is concentrated within the bones for a long period of time. During this storage americium will slowly decay and release radioactive particles and rays. These rays can cause alteration of genetic materials and bone cancers.</p> <p>Read more: http://www.lenntech.com/periodic-chart-</p>

Substance	Occurrence in e-waste	Health effects
		elements/Am-en.htm#ixzz0LnRNkSVm

Table 4: Hazardous substances found in some e-waste

Dioxins

Dioxins and furans are a family of chemicals comprising 75 different products of dioxin compounds and 135 related compounds known as furans. Dioxins • is taken to mean the family of compounds comprising polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs). Dioxins have never been intentionally manufactured, but form as unwanted by-products in the manufacture of substances like some pesticides as well as during combustion. Dioxins are known to be highly toxic to animals and humans because they bio-accumulate in the body and can lead to malformations of the foetus, decreased reproduction and growth rates and cause impairment of the immune system among other things. The best-known and most toxic dioxin is 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). For further information go to <http://www.deh.gov.au/industry/chemicals/dioxins/pubs/incinfinal.pdf>

Stakeholder consultation

D. STATUS QUO

The e-Waste Assessment of South Africa conducted in 2008, considered three primary e-waste streams: white goods, consumer electronics, and information technology (IT). By focusing on several tracer products in these categories – namely, fridges, washing machines, microwaves, TVs, PCs, printers, and mobile phones – it out-lines the current e-waste situation in South Africa. It also briefly considers the status of fluorescent discharge lamps, and rechargeable batteries used in electronic products.

It suggested that white goods are likely to become a major feature of e-waste volumes in the future – even surpassing IT as a tonnage percentage of the waste stream. For example, it is likely that microwaves will rival printers in the number of units entering the waste stream in the next five years. But despite e-waste initiatives elsewhere in the world, white goods vendors have so far not actively engaged in attempts to develop an industry-led e-waste solution in the country.

The assessment estimates that white goods, consumer electronics and IT in South African homes amount to anything between one million and two million tons, most of which is likely to enter the waste stream in the next 5-10 years. While storage of e-waste in institutions such as government departments and universities is reported to be high, the domestic storage of e-waste is also substantial – the amount of e-waste in storage in 358 middle-class households that participated in a survey conducted as part of this study could be packed into two-thirds of a 20-foot shipping container.

While the cost of logistics (i.e. transport) is a major cost challenge faced by recyclers, preventing the fluid flow of waste volumes in the country and in the region, grassroots e-waste projects currently piloted demonstrate that at least a minimum wage is possible through the manual dismantling of discarded technology. The assessment suggests that more new PCs are sold into the market each year than are recycled, which illustrates the opportunity for job creation and economic development presented by e-waste.

Finally, it shows that informal e-waste recycling includes mostly the early stages of recycling - collection, crude dismantling and sorting. Informal recyclers are vulnerable, often deal with e-waste in a hazardous way, and are open to exploitation.

Amongst other things, the assessment recommends the scaling up of public awareness campaigns that spell out the hazards of e-waste, the active engagement of all stakeholders in

the current drive by eWASA to establish an e-waste management system, the support of small business start-ups and informal recyclers, and support for the investment in new recycling technology through incentives. The complete assessment has been added to this plan as an annexure to allow reviewers the opportunity to review its findings.

E. PLANNING

This plan focuses on the collection; sorting, refurbishment, dismantling and recycling of the following categories of e-waste as described in the draft Waste Categorisation System for WIS Reporting gazetted for public comment on 23 July 2010.

CATEGORIES OF e-WASTE

7. IDENTIFICATION OF e-WASTE CATEGORIES

01	Large Household Appliances	Washing machines, Dryers, Refrigerators, Air-conditioners, etc.
02	Small Household Appliances	Vacuum cleaners, Coffee Machines, Irons, Toasters, etc.
03	Office, Information & Communication Equipment	PCs, Laptops, Mobiles, Telephones, Fax Machines, Copiers, Printers etc.
04	Entertainment & Consumer Electronics, and Toys, Leisure, Sports & Recreational Equipment, and Automatic Issuing Machines	Televisions, VCR/DVD/CD players, Hi-Fi sets, Radios, etc., and Electric train sets, coin slot machines, treadmills etc., and Vending machines, parking ticket equipment etc.
05	Lighting Equipment	Fluorescent tubes and lamps, sodium lamps etc. (Except Incandescent Bulbs, Halogen Bulbs) etc.
06	Electric and Electronic Tools	Drills, Electric saws, Sewing Machines, Lawn Mowers etc. (Except: large stationary tools/machines) etc.
07	Security & health care equipment	Surveillance and Control Equipment (e.g. CCTV cameras, scanning equipment), and Medical Instruments and Equipment (e.g. x-ray and heart lung machines) etc.
08	Mixed WEEE	

Table 5: Identification of e-Waste categories

Other electronic/electrical equipment not defined by WIS categorisation will be identified over time by the subscriber equipment sales declarations.

An e-waste category may be divided into sub-categories to facilitate the collection process.

8. PHASING CATEGORIES OF e-WASTE INTO THE COLLECTION PROCESS

All categories of electronic/electrical equipment manufactured or imported by subscribers to the eWASA Industry Plan will be included in the collection process within five years from the date when subscribers who manufacture or import those categories of electronic/electrical equipment join the eWASA Industry Plan.

Before including a category of e-waste into the collection process, eWASA will engage in discussions with the major producers of that category of equipment to establish the most efficient manner of how to deal with it.

SUBSCRIBERS

9. REGISTRATION

1. Any producer may become a subscriber to the eWASA Industry Plan.
2. The names of the initial subscribers to the eWASA Industry Plan are listed on annexure A and will thereafter be updated on the website — www.ewasa.org
3. All subscribers will be obliged to sign an agreement, an example of which can be viewed on the eWASA website, with eWASA detailing the responsibilities of both parties.
4. Subscribers may de-register from the eWASA Industry Plan with effect from the end of any financial year of eWASA on written notice of not less than 120 days prior to the end of the respective financial year-end of eWASA; provided that subscribers may not de-register with effect from a date which occurs within the period of (3) years commencing on the date upon which the respective subscriber registered with the eWASA Industry Plan.

10. DECLARATIONS

1. All subscribers must provide the external accountant with a monthly declaration of their equipment sales by category.

TRANSPORT CONTRACTORS

11. APPOINTMENT

1. A commercial tender process will be instituted in order to allow for free competition in the allocation of e-waste transport and storage contracts. Minimum requirements for appointment as a transport contractor will be;
 - a. Transfer site facilities sufficient to accommodate four months e-waste collected,
 - b. Establishment of a e-waste information system for the recording, collection, management and analysis of data and information that must enable the transporter to provide the declarations as provided for in 8,
 - c. A vehicle tracking system
 - d. Provision of mass measuring equipment at transfer sites and on vehicles,
 - e. Sound management and financial capability,
 - f. Existing track record, and
 - g. Valid BEE certificate
2. Contracts for periods up to five years will be awarded for successful tenders.

3. One or more transport contractor may be appointed in each province of South Africa.
4. Transport contractors may appoint transport sub-contractors within the province for which the contract has been awarded; provided that any such sub-contractor undertakes to eWASA to permit the inspections referred to in 18.2
5. eWASA will provide the transport contractors with a registration number which must be displayed on all trading documentation and waste product transport vehicles.
6. Transport sub-contractors must display the registration number of the transport contractor on their e-waste transport vehicles.

12. CONTRACTUAL OBLIGATIONS

Each transport contractor is obliged to:

1. Provide all equipment, transport, transfer sites, labour and supervision thereof necessary for the loading, transportation, storage, sorting, delivery, and accounting thereof of waste within the province for which the contract has been awarded;
2. Establish transfer sites:
 - a. That conform to the storage of e-waste requirements of the Waste Regulation;
 - b. That conform to all other legal requirements;
 - c. Store the waste in a manner that conform to the requirements of the Waste Regulation;
3. Provide service level undertakings:
 - d. To the dealers for the collection of e-waste;
 - e. At agreed intervals for collection, and
 - f. With minimum quantities for collection.
 - g. To the waste processors for the delivery of waste; and
4. Provide eWASA with copies of all service level undertakings;
5. Provide the necessary equipment to determine the mass/number of waste:
 - h. Collected from electronic dealers;
 - i. Collected from legacy waste stockpiles,
 - j. Received into and despatched from transfer sites; and
 - k. Delivered to waste processors;
 - l. Delivered to landfill sites;
6. Collection of e-waste
 - m. Only collect e-waste in the categories and brands for which its contract has been awarded;
 - n. Only collect e-waste from the electronic dealers identified by eWASA within the province for which the contract has been awarded;
 - o. Only collect e-waste from legacy e-waste stockpiles as and when instructed to do so by eWASA;
 - p. Only collect e-waste from other venues as and when instructed to do so by eWASA
7. Delivery of waste
 - q. Sort and prepare e-waste for delivery, as specified from time to time, by eWASA;
 - r. Deliver e-waste in the categories and quantities to e-waste processors as instructed by eWASA;
 - s. Deliver e-waste, or parts thereof, to landfill sites as and when instructed to do so by eWASA;
8. Documentation
 - t. Complete paper and electronic documentation, approved by eWASA, indicating date, time, venue and mass/number of waste collected and delivered.

13. DECLARATIONS

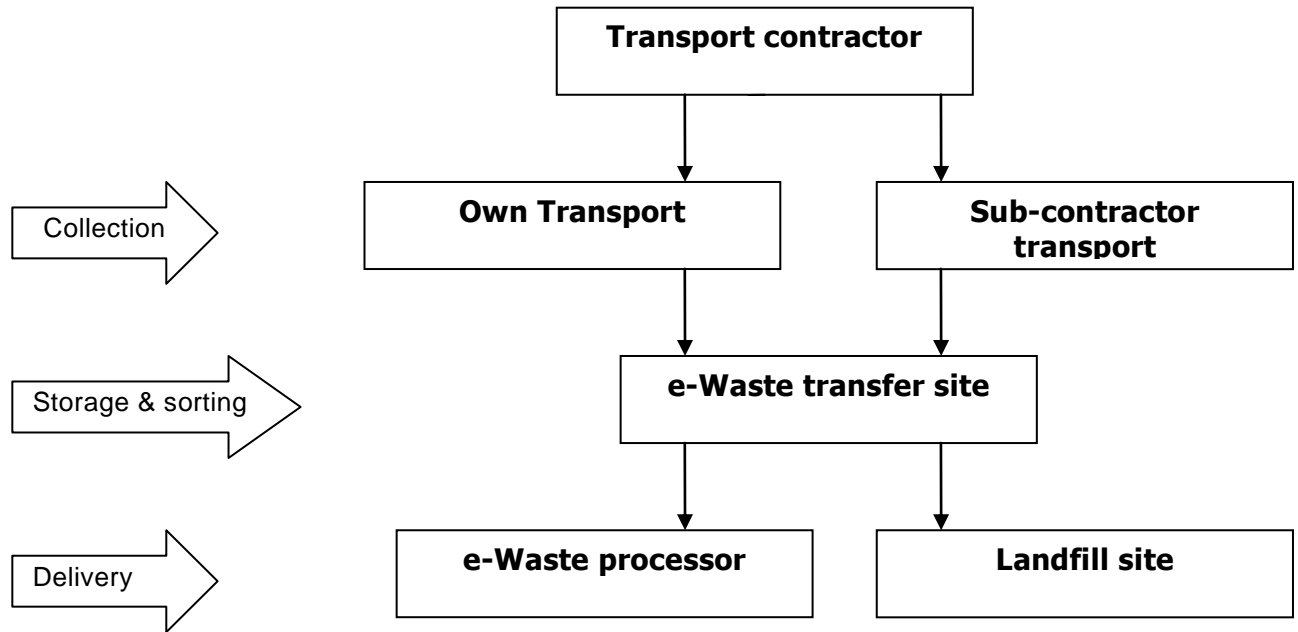
The transport contractors will provide eWASA, in the agreed format and frequency, with the mass/number of e-waste:

1. Collected from dealers;
2. Collected from legacy e-waste stockpiles;
3. Collected from other venues;
4. Received and despatched from each transfer site;
5. Delivered to e-waste processors;
6. Delivered to landfill sites;
7. Stock on hand at each transfer site and in transit, and
8. The number of personnel employed;
 - a. In the transport sector as;
 - i. Direct employees
 - ii. Sub-contractors
 - b. In the transfer sites as;
 - i. Direct employees
 - ii. Sub-contractors

14. PAYMENT FOR SERVICE

1. eWASA will pay the transport contractor, at the contracted rate and otherwise in accordance with the terms of the contract, monthly in arrears based on:
 - a. The mass/number or parts of e-waste delivered to e-waste processors,
 - b. The mass/number or parts of e-waste disposed of at landfill sites, and
 - c. The mass/number of e-waste stored at transfer sites.
2. No payment will be made for un-authorized deliveries,
3. Payments will only be made by bank transfer to designated company bank accounts,
4. Transport contractors will be responsible for the payment of their transport subcontractors.

15. DIAGRAM OF e-WASTE TRANSPORT CONTRACTOR ACTIVITIES



e-WASTE PROCESSORS

16. TENDER PROCESS

1. A tender process will be instituted in order to allow for free competition in the allocation of the e-waste collected.
2. The first tender offered by eWASA will be advertised not later than two months after the approval of the eWASA Industry Plan by the Minister.
3. eWASA will indicate in the tender document the expected mass/number and category, or sub-category, of e-waste to be collected, but that mass/number will not be guaranteed.
4. The tender will require as compulsory information:
 - a. Mass/number and category, or sub-category, of e-waste that the e-waste processor expects to use per annum;
 - b. The treatment process to be applied;
 - c. The mass/volume of general waste to be generated as a result of the treatment process;
 - d. The proposed period of the contract;
 - e. The proposed percentage of the treatment fee and / or the actual treatment fee they are tendering for.
5. Tenders will be directed to the external auditor for adjudication according to criteria based on a scorecard, see annexure B.
6. Preference will be given to e-waste processors engaged in recycling before considering processors engaged in recovery.
7. Tenders from landfill sites will not be considered.
8. e-Waste processors not being in possession of a permit, license or exemption issued by the relevant government authority to process e-waste will be included in the tender

process if they have applied for the necessary permit, license or exemption or commenced their EIA process, if required, and can submit satisfactory proof of this action.

9. eWASA will, from time to time, advertise tenders for additional mass/numbers, categories and sub-categories of e-waste available for processing that have been accumulated and that are in excess of contracted demand, allowing for new e-waste processors to enter into the market.

17. APPOINTMENT

1. eWASA will award contracts for the supply of e-waste to e-waste processors on the recommendation of the external auditor.
2. e-Waste processors will be obliged to sign a contract with eWASA detailing the responsibilities of each party.
3. Contracts awarded to parties not in possession of a permit, license or exemption will be subject to the conditional provision that the permit, license or exemption is obtained;
 - a. Should the permit, license or exemption not be obtained in the period provided for, the contract will be cancelled and the e-waste awarded in terms of the contract will be once again offered on tender.
4. Contracts will be awarded for periods of up to seven years.
5. Contracts will be reviewed annually and may be revised if amendments are required

18. DECLARATIONS

1. The e-waste processors will provide eWASA, in the agreed format, with the mass/number of e-waste or parts thereof:
 - a. Received from transport contractors;
 - b. Used in their treatment process;
 - c. Stored under their control.
2. The number of personnel directly employed in the e-waste facility

19. PAYMENT FOR PROCESSING OF e-WASTE

9. eWASA will pay the e-waste processor, in terms of the contract, based on the mass/number of e-waste used:
 - a. An establishment subsidy for a period of 60 months or for the contract period whichever is the shortest;
 - b. A treatment fee for the period of the contract.
10. Payments of both the establishment subsidy and the treatment fee will be made monthly in arrears:
 - a. By bank transfer to designated company bank accounts;
 - b. Only for e-waste received from eWASA appointed transport contractors.
 - c. Only for e-waste used in direct operations

ELECTRONIC AND ELECTRICAL EQUIPMENT DEALERS

20. REGISTRATION

1. Electronic/electric equipment dealers being supplied with appliances produced by subscribers to the eWASA Industry Plan must register with eWASA for the collection of those subscribers' e-waste from their premises;
2. After registration, in terms of 15.1, eWASA will issue the applicant with a registration number; and
3. The dealer must display, in a prominent position in the workplace:
 - a. The registration number issued by eWASA;
 - b. The registration number, name and contact details of the eWASA appointed transport contractor authorised to collect the e-waste of the subscribers' from the dealer;
 - c. The marketing and information posters, issued by eWASA indicating the recommended rates of the green fee (where applicable) for the various categories and sub-categories of e-waste.

21. RELEASE OF e-WASTE

1. Electronic/electric dealers may only release e-waste originating from subscribers to the eWASA Industry Plan to registered eWASA transport contractors or their subcontractors.
2. In order to minimise the cost to the consumer and to maintain the security of the dealer, the electronic/electric dealer must at such times and frequencies as may have been reasonably determined by the transport contractor, in consultation with the dealer and notified to the dealer:
 - a. Provide labour to assist with the loading of e-waste on the vehicle or container provided by the transport contractor; and
 - b. Provide supervision during the loading of the e-waste to ensure that no new, used refurbishable or recyclable appliances are loaded onto the vehicle or container provided by the transport contractor;
 - c. Ensure that only e-waste falling within the categories and brands on which a green fee has been levied, and no general waste, is loaded on the vehicle or container of the transport contractor;
 - d. Complete the documentation provided by the transport contractor confirming the collection transaction.

FUNDING

22. GREEN FEE

1. The green fee levied on the subscribers to the eWASA Industry Plan will be calculated to recover the cost of the e-waste management process.
2. The cost of the waste management process will be established by accumulating the costs for:
 - a. Collection and transport of e-waste from designated collection venues to transfer sites;
 - b. Collection and transport of e-waste from legacy waste stockpiles to transfer sites;
 - c. Storage, sorting and preparation of e-waste at transfer sites for delivery;
 - d. Delivery of e-waste to e-waste processors, or landfill sites;
 - e. Disposal fees at hazardous landfill sites,
 - f. Establishment and treatment fees for e-waste processors;
 - g. External auditor, for auditing function;

- h. External accountant for electric and electronic appliances sales and green fee administration;
 - i. Social awareness and marketing campaign;
 - j. eWASA administration, including the costs of all goods and services required by eWASA for its operations as discussed with electronic and electrical equipment manufacturers/vendors at the eWASA Recycling Cost Meeting in Jan 09.
3. The green fee shall be calculated by dividing the costs referred to in paragraph 22.2 by the projected mass of equipment sales as declared by the subscribers in terms of paragraph 4.1 and will, to such extent as may be determined to be appropriate but without any obligation, endeavour to match costs in relation to a category of electronic/electrical equipment with the levy in respect of that category of electronic/electrical equipment.
 4. The green fee will be calculated annually in terms of paragraph 22.3 and notified to subscribers, but will be subject to change depending on the actual equipment sales, e-waste collections and actual cost of the e-waste management process.

23. INVOICING OF GREEN FEE TO ELECTRIC & ELECTRONIC APPLIANCE CONSUMER

The green fee is a non-commercial recovery of costs of environmental compliance and will not interfere with any competitive issue as discussed during the.

1. Where the new appliance is sold as a commodity and in order to promote awareness of the costs of processing e-waste and of the environment:
 - a. The subscribers will be encouraged (but not obliged) to raise the green fee without increasing the amount thereof as charged by eWASA as a separate line item when invoicing their customer;
 - b. The dealer will be encouraged (but not obliged) to raise the green fee as a separate line item when invoicing the appliance consumer.
2. The green fee will be advertised widely in order to raise the consumer's awareness of the recommended rates.

24. COLLECTION FEE

Where for practical reasons no green fee has been raised by the subscribers in respect of sales of new appliances of a particular category, eWASA may elect to charge a collection fee on the collection or receipt of e-waste in that category as an alternative to the green fee, to cover the costs associated with transporting and processing that category e-waste.

25. ESTIMATION OF COST PER ANNUM

The estimated cost of implementing the eWASA Industry Plan for the first year of operation is R374 million.

This estimate of costs can be broken down into 7 categories: New Technology, Transport, and Collection Points, Packing materials, Media Awareness, Education & Training and Administration. The bulk of these costs (two thirds) relate to new Recycling Technologies. This is an estimate of the costs associated with setting up the technology to adequately treat all forms of e-waste to WEEE Standards.

R100 million for a refrigeration recycling plant,
 R32 million for a printer cartridge and Toner Bottle Recycling plant,
 R26 million for a CFL Lamp Recycling Plant,
 R112 million for a Battery Recycling Plant.
 Transport is guesstimated at R74 million,
 Packing materials at R5 million,
 Media Awareness at R2 million,
 Education & Training at R5 million and
 Administration at R3 million.

Please note that a number of these costs are already in the “system” and would therefore not be new “direct” costs. In addition it is envisaged that the CAPEX required for new plant technology would come from Public/Private Partnerships. The eWASA administration costs would be funded at 12% of the collected ‘green fee’ while aiming to reduce this percentage annually to around 5%,

The cost of the following four years will be affected by the annual incorporation of additional categories of e-waste, the rate of inflation, the cost of fuel and the number of subscribers.

LEGACY WASTE STOCKPILES

26. LEGACY STOCKPILES WITH AN IDENTIFIED OWNER

1. A register of all stockpiles of e-waste in each province of South Africa will be established using the information obtained by DEA in terms of the Regulation indicating:
 - a. The physical address of the stockpile;
 - b. Estimations of the number of e-waste stored within each stockpile;
 - c. Categories of e-waste stored within each stockpile;
 - d. Details of the e-waste stockpile owner;
 - e. The DEA registration number of the e-waste stockpile owner.
2. The details of any stockpile identified, not having a DEA registration number, will be communicated to DEA for registration.

27. ABATEMENT OF LEGACY WASTE STOCKPILES WITH AN IDENTIFIED OWNER

1. In terms Part 3 section 8 (3) of the Waste Regulation, stockpile owners are responsible for the preparation and funding of abatement plans.
2. eWASA will consider proposals made by stockpile owners and endeavour to assist with the abatement by:
 - a. Providing the stockpile owner with the details of waste processors in need of supply;
 - b. Accepting the e-waste into the eWASA Industry Plan from a date when it becomes possible to process the e-waste, but eWASA will not have any obligation to accept such waste unless it subsequently agrees in writing to do so.

28. ABATEMENT OF LEGACY WASTE STOCKPILES IN TOWNSHIPS

1. The abatement of stockpiles in townships will take precedence over abatement of stockpiles with an identified owner, in the eWASA Industry Plan.
2. Events will be arranged with consumers in an area where a clean-up is proposed. This will be done taking into consideration:
 - a. The location of the stockpile with priority being given to those stockpiles adjacent to clinics and schools;
 - b. The distance of the stockpile from a transfer site or a waste processor.
3. Incentives will be proposed to civic organisations, such as schools, churches and NGOs, for the collection and accumulation of e-waste in the area. In keeping with the principle of eWASA not to pay for waste, alternative schemes will be identified such as:
 - a. The provision of equipment, or
 - b. The provision of non-cash donations.
 - c. The value of the equipment donated to the organisation will be based on the number/mass of waste collected by the waste transporter.

4. The e-waste accumulated by the community will be removed from the collection site on the same day as the event takes place.

29. EFFECTIVE DATE OF ABATEMENT OF LEGACY WASTE STOCKPILES

1. It is unlikely that new e-waste processors will be in a position to accept waste in the first two to three years of operation of the eWASA Industry Plan due to:
 - a. Procurement time of plant and machinery;
 - b. Environmental Impact Assessments, where necessary;
 - c. Permitting of waste processors by the relevant authorities.
2. Abatement of the legacy waste stockpiles is estimated to begin 30 months after collection of waste from dealers begins.

GENERAL

30. JOB CREATION

The implementation of the eWASA Industry Plan necessitates the expansion of two industrial sectors being:

1. e-Waste transport
 - a. The contracted transport contractors will be obliged to collect waste from every city and town in South Africa, to establish transfer sites and to deliver the waste to e-waste processors, this will require:
 - b. The employment of staff or appointment of transport sub-contractors;
 - c. The employment of personnel at the transfer sites.
2. e-Waste processing
 - a. The appointed e-waste processors will require personnel to work in and manage the new operations that are set up to make use of the e-waste that are made available.

31. TRAINING AND DEVELOPMENT

Transport contractors and e waste processors will be required, as a condition of their appointment, to institute training and development programmes and to submit annual reports detailing the results of these programmes.

32. GENERAL WASTE

eWASA will not be responsible for the collection of any general waste (including remnants of appliances) generated by the:

1. Subscriber as a consequence of the manufacturing process;
2. Appliance dealer as a consequence of their dealing in appliances;
3. e-Waste processor as a consequence of the processing of e-waste;
4. The e-waste transporter as a consequence of their management of e-waste;
5. Any other person or institution for any reason, and
6. If contracted to do so, the cost of such collection shall be borne by the other party.

33. ANNUAL REPORTING TO DEA

1. The compliance of eWASA to the eWASA Industry Plan;
2. The compliance with the relevant legislation, the Waste Regulations, 2009, and all other applicable law;
3. Record keeping and reporting as required by the eWASA Industry Plan;
4. Number of personnel employed;
5. Development of the recycling market;
6. Details of agreements reached in terms of legacy waste product stockpile abatement plans;
7. Details of additional categories of electronic/electrical equipment included in the management process.
8. Annual projection of the number of electronic/electrical equipment managed by the Plan.
9. Financial reports.

34. INDUSTRY STANDARDS

1. Waste transporters — to comply with the Waste Regulations, 2009 and all other applicable laws.
2. Waste transfer sites — to comply with the Waste Regulations, 2009 and all other applicable laws.
3. Waste processors— to comply with the Waste Regulations, 2009 and all other applicable laws.

35. DISCLAIMER

eWASA shall at under no circumstances be liable for any consequential, indirect, special, incidental or other losses and/or damages, of whatever nature suffered by any subscriber, transport contractor, e-waste processor, dealer, sub-contractor, consumer or any other person whomsoever arising out of or in connection with (i) the eWASA Industry Plan and/or its implementation; or (ii) any act or omission of any of the above mentioned persons.

36. EFFECTIVE DATE

In respect of e-waste, collection of:

1. The green fee will begin not later than 6 months; and
2. e-Waste collection will begin not later than 3 months.

37. SETTING TARGETS ON REDUCTION, RE-USE, RECYCLING AND RECOVERY

Setting targets for reduction re-use, recycling and recovery is required in the generic guideline document for preparing industry waste management plans published by DEA in June 2010.

With recycling statistics for e-waste still improving it is suggested that a general collection target of 10% is set to be reviewed annually by the eWASA Board, as and when more complete statistics are available working through the reporting mechanisms of this plan in conjunction with the required reporting to the WIS system.

Experiences in other countries have shown that targets per product category can be more effective, especially since there are huge differences in the lifetimes of different e-waste categories defined in terms of the WIS regulation. While the average PC might have a lifetime of between 3 and 7 years, large appliances such as fridges have a lifetime of between 15 and 20 years.

38. THE PHASING OUT OF THE USE OF SPECIFIED SUBSTANCES

Manufacturers of electronic and electrical equipment are already expected to phase out hazardous substances in equipment in terms of the EU ROHS Directive. Such initiatives should be encouraged for all products imported into and manufactured for the South African market. Reduction of hazardous substances, waste minimisation and design for recycling should be key requirements in such regulation.

F. IMPLEMENTATION

	Responsibility	Resource allocation	Timeframes
Objectives	eWASA	12% of Green Fee	Ongoing
Administer sustainable e-waste management system			
Promote a sustainable environmentally responsible e-waste industry	eWASA	Included in 12% allocated to eWASA	Ongoing
Categories Of E-Waste	eWASA working with DEA – current WIS regulation categories		As and when required
Identification Of E-Waste Categories			
Phasing Categories Of E-Waste Into The Collection Process	eWASA		Phased from implementation date to 10 years in future.
Subscribers	eWASA	Green Fee	Ongoing
Registration			
Declarations	Subscribers		Ongoing on bi-annual basis
Transport Contractors	eWASA	Green Fee	Ongoing
Appointment			
Declarations	Contractors		Monthly
Payment For Service			
Ewaste Processors	eWASA	Green Fee	Bi-annually
Tender Process			
Appointment	eWASA		
Declarations for payment for Processing of E-Waste	Processors	Green Fee	Monthly
Electronic And Electrical Equipment Dealers	eWASA	Green Fee	Ongoing
Registration			

	Responsibility	Resource allocation	Timeframes
Release Of e-Waste Funding Green Fee	Dealers		Ongoing
Invoicing of Green Fee to Electric & Electronic Appliance Consumer	Entire supply chain – fee is passed on preferably visible. Manufacturer/Importer pay the fee upfront at date of entry into the country		Ongoing
Collection Fee	e-waste processor/ eWASA		Ongoing
Legacy Waste Stockpiles Abatement of Legacy Waste Stockpiles With an Identified Owner	Owner	Owner of stockpile	Within 3 years after implementation
Abatement Of Legacy Waste Stockpiles In Townships	eWASA	Green Fee	Within 3 years after implementation
General Job Creation Training And Development	eWASA & Industry	Part of 12% allocation to eWASA	Ongoing
Annual Reporting To DEA	eWASA	Green Fee	Ongoing
Industry Standards	eWASA	Green Fee	Ongoing
Setting Targets On Reduction, Re-Use, Recycling And Recovery	eWASA	Green Fee	Ongoing
The Phasing Out Of The Use Of Specified Substances Monitoring, Review And Reporting	Manufacturers	R&D cost to manufacturer	Ongoing
External Auditors Appointment	eWASA		

	Responsibility	Resource allocation	Timeframes
Non-Compliance By Contracting Parties	eWASA		
Reporting	Auditors		
External Accountants Appointment	eWASA		
Non-Compliance By Subscribers	eWASA		
Reporting	Accountants		

Table 6: Implementation

G. MONITORING, REVIEW AND REPORTING

EXTERNAL AUDITORS

39. APPOINTMENT

1. eWASA will appoint external auditors for a period of three years through a tender process.

40. RESPONSIBILITIES

1. Subscribers:
 - a. Audit all documentation supporting the monthly equipment sales declarations and payments of green fees;
1. Transport contractors:
 - a. Audit all;
 - b. Documentation and processes supporting the monthly e-waste collections and deliveries;
 - c. Permits or licenses allowing for the transportation and storage of e-waste;
 - d. Certificates of calibration of measuring equipment and general housekeeping of transfer sites.
 - e. Documentation and processes supporting e-waste inventory;
 - f. Insurance policies for;
 - g. Public & professional liability,
 - h. Assets,
 - i. Theft,
 - j. Fire.
2. e-Waste processors:
 - a. Adjudicate all tenders received according to the scorecard, annexure A, and make recommendations to eWASA with regard to the awarding of contracts.
 - b. Audit all;
 - c. Documentation supporting e-waste receipts from transport contractors;

- d. Permits, licenses or exemptions allowing for the treatment of e-waste;
- e. Treatment of the e-waste in terms of their supply contract.
- f. Certificates of calibration of measuring equipment and general housekeeping of processor's plant,
- g. Documentation and processes supporting e-waste inventory.

3. External accountants:

- a. Audit all
- b. Subscriber electronic/electric appliance sales declarations and green fee invoicing;
- c. Receipt of green fee from subscribers;
- d. Outstanding amounts due from subscribers;
- e. Transfer of green fee collected to eWASA.

41. NON-COMPLIANCE BY CONTRACTING PARTIES

If the external auditor, upon review of documentation, finds any breach of any provision of a contract they will report that breach to eWASA for action within 48 hours of finding that breach. Upon receiving any such notice or otherwise discovering any breach eWASA will give notice to the offending party and the Minister and should that party fail to remedy such breach within 14 days of the date of the written notice by eWASA requiring it to do so, then eWASA shall be entitled, in addition to any other remedy available to it at law;

- 1. Subscribers:
 - a. To de-register the subscriber giving 120 days notice
- 2. Transport contractor
 - a. To cancel the contract
- 3. Waste product processor
 - a. To cancel the supply contract
- 4. External accountant
 - a. To cancel the administration contract

and to claim damages or penalties as determined in the respective contracts referred to above.

42. REPORTING

The external auditors will submit reports to eWASA detailing:

- 1. Subscribers:
 - a. Confirmation of compliance with conditions of agreement;
- 2. Transport contractors:
 - a. Confirmation of compliance with conditions of contract;
 - b. Total mass/number of e-waste collected by category;
 - c. Total mass/number of e-waste stored by category;
 - d. Total mass/number of e-waste delivered by category;
 - e. Total remuneration received from eWASA.
- 3. e-Waste processors:
 - a. Confirmation of compliance with conditions of contract;
 - b. Total mass/number of e-waste received by category;
 - c. Total mass/number of e-waste stored by category;
 - d. Total mass/number of e-waste treated by category;
 - e. Total remuneration received from eWASA.
- 4. External accountants:
 - a. Total green fee invoiced by category;
 - b. Total green fee outstanding;
 - c. Total product sales by category and sub-category

- d. Total remuneration received from eWASA.
5. The external auditors will prepare the eWASA budget using information provided by eWASA and that budget will then be submitted to the board of directors of eWASA for approval annually.

43. CONFIDENTIALITY

The external auditor will treat all information acquired as a result of their duties as detailed in paragraph 18, and not in the public domain, as confidential.

EXTERNAL ACCOUNTANTS

44. APPOINTMENT

1. To ensure that the market share of each subscriber is kept confidential, eWASA will appoint external accountants.
2. The external accountants will be appointed for a three year period through a tender process.

45. RESPONSIBILITIES

The external accountants will;

1. Receive the monthly electric and electronic appliances sales declarations from the subscribers;
2. Invoice the green fee monthly to the subscribers based on their electronic/electrical equipment sales declarations;
3. Collect the green fee from the subscribers;
4. Open a trust bank account in the name of the eWASA;
5. Transfer the consolidated collections of the green fee to eWASA.

46. NON-COMPLIANCE BY SUBSCRIBERS

If the external accountants, upon review, finds any monthly electronic/electrical equipment sales declaration missing, incomplete or in variance with expectation, then they will report their finding to eWASA for action within 48 hours of the finding. Upon receiving any such notice eWASA will either;

1. Instruct the external accountants to attempt to solve the matter with the subscriber telephonically, or
2. Instruct the external auditor to arrange for an audit of the subscriber.

47. REPORTING

The external accountants will submit monthly reports to eWASA detailing:

1. Consolidated invoiced green fee by e-waste category,
2. Coded debtor outstanding list,
3. Consolidated electronic/electrical equipment sales by category and sub-category

48. CONFIDENTIAL

The external accountants will treat all information acquired as a result of their duties as detailed in paragraph 2, and not in the public domain, as confidential.

H. CONCLUSIONS

About the eWASA Initiative:

Our declared aim is to plan, initiate and facilitate the sustainable reduction and handling of e-waste at political, social, economic and ecological levels.

Our prime objectives are:

- optimizing the life cycle of electric and electronic equipment by
 - improving supply chains
 - closing material loops
 - reducing contamination
- increasing utilization of resources and reuse of equipment
- increasing public, scientific and business knowledge
- developing clear policy recommendations between companies, governmental and non-governmental organizations and academic institutions.

eWASA is open to companies, governmental organizations, academic institutions, NGOs and NPOs and international organizations which commit to proactive and constructive participation in the work of eWASA. eWASA members are expected to contribute monetarily and in kind to the existence and development of the initiative.

eWASA's core principles:

1. eWASA's work is founded on scientific assessments and incorporates a comprehensive view of the social, environmental and economic aspects of e-waste.
2. eWASA conducts research on the entire life-cycle of electronic and electrical equipment and their corresponding global supply, process and material flows.
3. eWASA's research and pilot projects are meant to contribute to the solution of e-waste problems.
4. eWASA condemns all illegal activities related to e-waste including illegal shipments and reuse/ recycling practices that are harmful to the environment and human health.
 - eWASA seeks to foster safe and eco/energy-efficient reuse and recycling practices around the globe in a socially responsible manner.

I. REFERENCES

1. Satrp Company Integrated Industry Waste Tyre Management Plan, Feb 2009
2. Solving The E-Waste Problem ([Step](#))
3. Restriction Of Hazardous Substances, [Directive 2002/95/Ec Of The European Parliament](#)
4. White Paper On The Revision On Eu's Weee Directive - Com (2008)810 Final (Step)
5. E-Waste Take Back System Design And Policy Approaches (Step)
6. The E-Waste Guide ([Ewasteguide.Info](#))
7. Microelectronics And Computer Technology Corporation (Mcc). 1996. Electronics Industry Environmental Roadmap. Austin, Tx: Mcc
8. E-Waste Assessment South Africa, Nov 2008, Ewasa, Finlay A; Liechti D
9. Ewasa Recycling Cost Meeting, 28 January 09
10. Ewasa Manufacturers/Vendors' Meeting, 20 May 09
11. Producer Forum Meeting With Ewasa, 6 Oct 2010.

J. APPENDICES OR ANNEXURES

Annexure A

List of Electronic/Electrical Equipment Producers being initial subscribers to the eWASA Industry Plan

eWASA Membership NO	NAME
25	LG Electronics
41	Mustek Limited

Annexure B

Waste Processor Scorecard

Item	Description	Score		Maximum Rating
		Max	Actual	
A	Application (hierarchy)	10		
1	Recycling			10 points
2	Fabricated products			8 points
3	Re-use			6 points
4	Energy recovery (principal or secondary fuel source)			4 points
B	Percentage of product processed	7		
6	Recycling			Treatment by weight of the e-waste 100% -7 points; 90% -5 points; 80% -6 points; 70% - 4 points. Less than 70%- 0 points (open veldt burning or e-waste used as weight = nil points)
7	Fabricated products			
8	Re-use			
9	Energy recovery (principal or secondary fuel source)			
C	Equity ownership (job creation)	5		
11	BBBEE			Level 5 or better = 5 points Level 6 and lower = 0 points
D	Status of operation	10		
12	Existing and operating business with waste product feeder to plant			Score 10 if operating for at least three months producing product and sales made. Score zero if plant not installed and operating
E	Phase one categories of e-waste	5		
13	Will accept all categories of e-waste			Score 5
14	Will only accept 8- 19.5"			Score 4
15	Will only accept 20-24.5"			Score 3
16	Will only accept Bias electronic/electrical equipment			Score 5
F	Treatment Fee	20		
	Percentage of treatment fee requested			Pro rata: Nil fee requested 20 points 100% fee requested = nil points
G	Date of acceptance of e-waste	10		
18	Within 3 months from collection start date			Score 10 points
19	Within 6 months from collection start date			Score 8 points
20	Within 9 months from collection start date			Score 6 points
21	Within 12 months from collection start date			Score 4 points
22	Longer than 12 months from collection start date			Score 0 points
H	Business plan and financing	18		
23	Business plan			Pro rata: best scores 8

				points and worst nil points
24	Financing			Pro rata: best scores 10 points and worst nil points
I	Accepted proven international technology	15		
25	Best Accepted Practice and Technology (BAPIBAT)			Score maximum of 15 points
	Total points	100		

SMME user of less than 36 ton e-waste per year qualify automatically if all legal requirements in place and not further than 150 km from outer city limit.

Annexure C

See SA_e-Waste_Assessment_FINAL_201108.pdf

Annexure D

eWASA Meeting minutes:

1. Minutes_eWASA_280109.pdf
2. Minutes_eWASA_110309.pdf
3. Minutes_eWASA_200509.pdf
4. Re Producer Forum meeting with eWASA.eml

¹ Source StEP <http://www.step-initiative.org/initiative/what-is-e-waste.php>