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TOWARDS SUSTAINABLE E-WASTE MANAGEMENT IN SOUTH AFRICA

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OUTLINE

- Introduction
- e-Waste recycling process in SA
- Refurbishing & re-use of electrical & electronic equipment (EEE)
- Legislation relevant to e-Waste management in SA
- Conclusion



INTRODUCTION

e-Waste management in SA! How are WEEE doing?

- biggest obstacle in addressing of e-waste problem is the lack of comprehensive data & systematic studies undertaken to determine the magnitude of the e-waste problem in SA



INTRODUCTION

- Minister of DEA, Edna Molewa, issued notice (2015) requiring **electronics & electrical sectors** to submit a **National e-Waste Industry Waste Management Plan** for adoption by the country.
- Minister led a national consultative conference on e-Waste in Gauteng
Conference **focused** on:
 - **contextualisation** of the e-Waste **challenges** in SA
 - management of e-Waste in **Municipalities**
 - e-Waste **Recycling**
 - Policy/**Legislation**



INTRODUCTION

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- e-Waste is not unique to SA = global phenomenon. It is imported & exported around the world for different purposes:
 - recycling



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Known and Suspected Routes of e-waste Dumping



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 - recycling
 - disguised as near end of life second hand goods or donations.
- UNEP forecasts that obsolete computers, in China/SA will rise by 500% in 2020 wrt 2007. Statistics show developed countries will increase exports of e-Waste into China/SA 50-80%.
- This is exacerbated by low levels of consumer awareness & unregulated disposal, collection, recycling e-Waste processes.



BACKGROUND

SA - population of 55 million
42+ million m³ MSW generated/year
80+ % landfilled



BACKGROUND



BACKGROUND



BACKGROUND

- SA – e-waste generation = 2-million t/yr
- Formal recyclers process 20% - rest:
 - stored by owner
 - recycled informally
 - added to domestic waste stream
 - dumped illegally
- Recycling of e-waste & non-ferrous and ferrous metals is well established in SA.
- SA faces a number of **recycling challenges**:
 - dealing with hazardous fraction (CRT, glass)
 - finding markets for flame retardant plastics
 - printed circuit boards



AIM OF THE STUDY

- Determine the magnitude of e-waste situation in SA
- Assess the capacity of SA to handle e-waste
- Formulate recommendations on life cycle management of e-waste
- Formulate recommendations on safe disposal materials
- Evaluate gaps - e-waste legislation



HISTORY OF E-WASTE PRODUCED IN SA

- Factors causing concern of e-waste quantities produced in developing countries
 - most EEE used are imported - destination countries have very limited capacity in terms of technological knowhow in complete recycling of EEE which would have reached their end of life period.
 - poor quality EEE destined for developing countries as majority of populations have financial constraints in acquiring EEE of superior brands - flood developing countries markets with inferior products with short life span.
- Due to initiative of Intl. producers & importers based on EPR principles, the support through Intl. development aid programmes (e.g. Swiss e-Waste Programme) and corporate (HP/Dell/Nokia) SA now implementing National e-waste recycling compliance scheme



E-WASTE RECYCLING PROCESS IN SA

The e-Waste Value Chain

Interviews with SA companies were conducted to determine the **current state** of e-waste infrastructure in the **collection, disposal, recycling** processes are in the country.

As agreed during the interview process no companies are directly named in this study to ensure that all company information remains confidential.



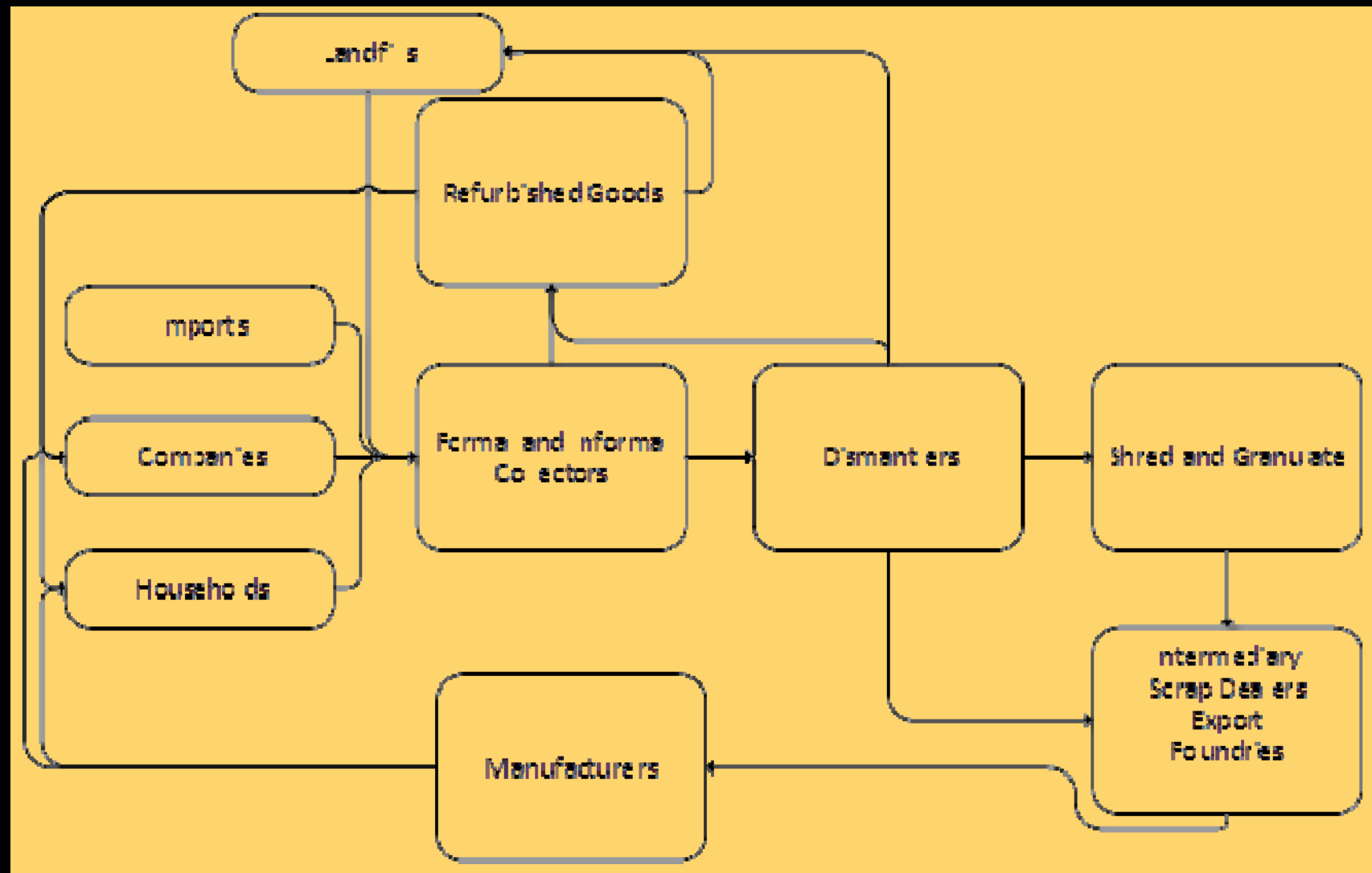
E-WASTE RECYCLING PROCESS IN SA

The e-Waste Value Chain

COMPANY A	Number of staff	2
	Monthly waste recovery	±20 tons
	Specialisation	Collection, Refurbishment
	Preferred e-waste type	Personal Computers
	Turnover	N/A (Less than a year in existence)
COMPANY B	Number of staff	25
	Monthly waste recovery	±2000 Computers
	Services	Collection, Refurbishment, Shredding
	Preferred e-Waste Type	Personal Computers
	Turnover	ZAR 15 Million
COMPANY C	Number of staff	5
	Monthly waste recovery	±15 to 20 tons
	Services	Collection, Dismantling & Refurbishment
	Preferred e-waste type	All types
	Turnover	ZAR 950 000
COMPANY D	Number of staff	90
	Monthly waste recovery	420 tons
	Services	Collection, Dismantling, Shredding
	Turnover	Confidential

E-WASTE RECYCLING PROCES IN SA

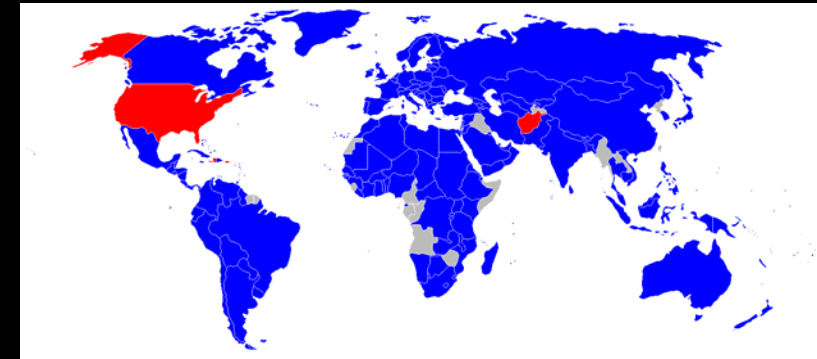
Flow of e-waste through the different processes



E-WASTE RECYCLING PROCESS IN SA

Sources of e-Waste

- importation of e-waste, Article 11 of the Basel Convention allows:
 - allows SA companies with necessary equipment to import & process e-waste locally.
- SA does not support importation of e-waste where majority of e-waste is disposed of.
- issue of importation will be addressed - future legislation as stated in Draft National Waste Management Strategy (2011) documentation currently reviewed by stakeholders operating in e-waste environment.



E-WASTE RECYCLING PROCESS IN SA

e-Waste Collection Process

- households & businesses take e-waste to e-waste collection company
- e-waste collected from landfills by informal collectors & bought by e-waste collection companies.



E-WASTE RECYCLING PROCESS IN SA

e-Waste Collection Process

- Collection process starts with collection company contacting or being contacted by household/business (**waste generator**) to dispose of their waste.
- e-Waste collector evaluates waste to be collected & indicates if the waste generator will **receive** or **make a payment** for waste removal.
- Payments determined based on **weight of valuable material** or **re-usable items** that can be recovered from the e-waste.



E-WASTE RECYCLING PROCESS IN SA

e-Waste Collection Process

- Collection companies interviewed:
 - indicated that collection of e-waste from businesses resulted in the highest number of goods that could be refurbished or re-used.
 - the min. amount of e-waste required before a collection company will dispatch a collection vehicle varies depending on the collection company's ability to absorb the cost of fuel & labour (logistical costs) for the collection & dismantling of the e-waste.



E-WASTE RECYCLING PROCESS IN SA

e-Waste Collection Process

- amount required for a collection company to **sustain business** depend on its ability cover **overheads** & acquire high value waste items that contain materials listed on the LME
- Metals that can be recovered : copper, aluminium, lead, & **prices fluctuate** according to international demand for metals.
- Some cases waste is not **weighed** but **counted** as units (computer cases, monitors,) & **prices paid per unit of waste**. Products that still function resold as second hand goods by collector.



E-WASTE RECYCLING PROCESSES IN SA

e-Waste *Collection Process*

- Material that requires further processing
 - separate valuable & non-valuable material - sent to facilities to dismantle or processed by collection company.Separated waste has higher value due to labour that went in process to separate material.
- All companies interviewed involved in collection & dismantling e-waste.
- All indicated that e-waste items i.g batteries sent to facilities specialises in disposal of hazardous chemicals inside batteries.



E-WASTE RECYCLING PROCESS IN SA

e-Waste *Dismantling* Process

- Subcomponents separated into categories
 - **valuable** (ferrous & nonferrous metals)
 - **non-valuable** materials (some plastics contain flame retardants - cannot be recycled), sold to companies that shred/granulate, scrap metal dealers, intermediaries that export, material sold directly to foundries.



E-WASTE RECYCLING PROCESSES IN SA

e-Waste Dismantling Process

Deconstruction of a Typical
Computer System

Computer

Monitor

Case

Hard drive

Motherboard
(Printed Circuit
Board)

Keyboard &
Mouse

Copper

Glass

Plastic

Aluminium

Plastic

Printed
Circuit
Board

Metal

Plastic

Copper

Aluminium

Printed
Circuit
Board

Plastic

Copper

Copper

E-WASTE RECYCLING PROCESSES IN SA

e-Waste Dismantling Process

Typical prices paid
per item by dealers

Waste Item	Price per kilogram (ZAR)	
	2015	2017
Motherboards	10 to 33	10 to 33
Central Processing Units	200	800
Hard drives	1.50 to 3	10
CD Rom Drives	1	1
Cellular Phones	0.80 to 1.50	0.80 to 1.50
Batteries (Lead)	2	4
Computer Power Supplies	1.50	1.5
Mixed E-Waste	3	3

E-WASTE RECYCLING PROCESS IN SA

Shredding, Granulation & Disposal

- Materials that **cannot be dismantled** further by dismantling companies are sent to facilities that **shred/granulate waste** using industrial shredding equipment.
- The **process starts** with **low skilled workers** (similar to dismantlers) sorting waste into various categories & storing them in piles/containers for purpose of shredding.
- The **objective** of shredding is to **maximising** amount of **space** used for **shipping** e-waste fractions to **downstream** processors. These fractions processed further to extract metals embedded in products such as printed circuit boards.



E-WASTE RECYCLING PROCESS IN SA

Shredding, Granulation & Disposal

- From interviews it was indicated that SA companies, that shred waste into fractions, use facilities in other non-African countries to process fractions further.
- This is due to lack of specialised infrastructure in SA & other African countries that are capable of processing complex e-waste items such as CRT that contain hazardous substances.



E-WASTE RECYCLING PROCESS IN SA

Shredding, Granulation & Disposal

- Issue to consider - some forms of e-waste can become obsolete making specialised facilities unfeasible in the long run if they cannot adapt to process new waste streams.
 - example - LCD televisions/monitors replace CRT technology. Impact is sharp decline CRT and sharp rise in LCD.
- Respondents interviewed indicated that they only sell WEEE to facilities that can deliver proof of **ISO14001 status** - ensure that waste will be processed further - **environmentally friendly & responsible** manner.



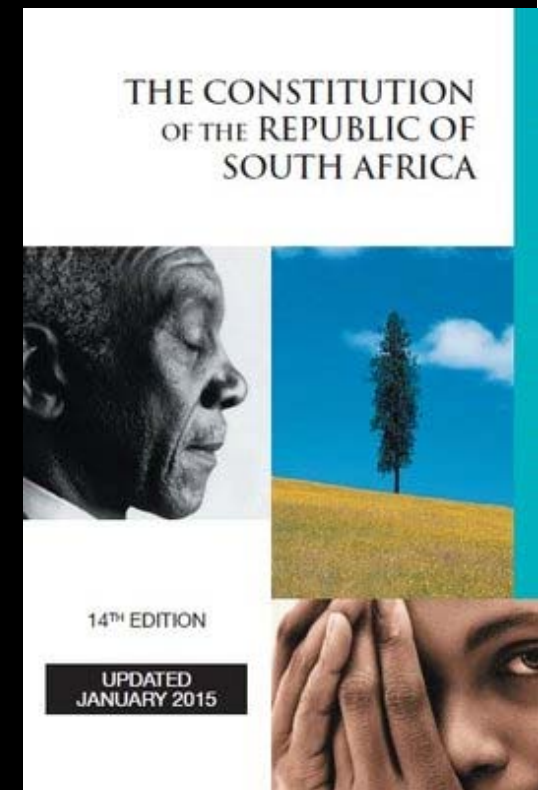
REFURBISHING & RE-USE OF EEE

- Source of income for the e-waste collector & dismantler is the **refurbishment** or **salvaging** of goods found in e-waste stream.
- **Six interviewed companies** were dealing in **computers** that could be **refurbished & sold** to retailers of second hand computer systems, while one had other forms of refurbished goods such as **television sets & copier machines**.
- Handling of second hand equipment must comply with processes stipulated **Second Hand Goods Act** (Act 6 of 2009) & all transactions must be recorded to enable traceability of goods purchased & sold.



LEGISLATION RELEVANT TO E-WASTE IN SA

- SA currently **does not have** any **dedicated** legislation dealing with e-waste
- The Constitution of the Republic of SA
(Act 106 of 1996)
Constitution that strongly recognizes the **principles of environmental protection** and justice as a fundamental human right.



LEGISLATION RELEVANT TO E-WASTE IN SA

- **The National Environmental Management: Waste Act, 2008** (NEMA) (Act 59 of 2008)
 - regulates waste man. in SA to protect health & environment by providing measures for prevention of pollution & ecological degradation.
 - Act came effect **1 July 2009**, amended - Act, 2014 (Act No. 26 of 2014) with effect **2 June 2014**.
 - Note : Waste Act provides for measures to deal with both general/ hazardous waste & **e-waste treated as hazardous waste** in line with the precautionary principle.

WASTE ACT MADE EASY



A user friendly guide to the National Environmental Management Waste Act, 2008 (Act No. 59 of 2008)



environmental affairs

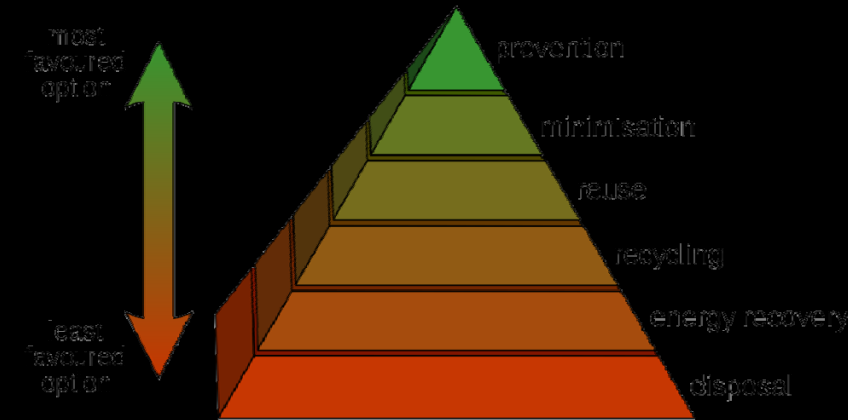
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

LEGISLATION RELEVANT TO E-WASTE IN SA

- The National Environmental Management: Waste Act, 2008 (NEMA)
 - Part 7 of the Act provides for development of Industry Waste Management Plans where waste generated poses threat to environment & requires intervention through collective effort.

the listed activities that ALL require licences:

By law you are NOT allowed to store in excess of 35 m³ waste at any time or sort/bale more than 500 kg per day without a licence.



CONCLUSION

- In its current state the definition of hazardous waste in various pieces of legislation is a source of confusion amongst consumers & recyclers.
- SA needs legislation - focused specifically on e-waste & that addresses process of disposal by generators of waste & companies recycling e-waste.
- Broad information on correct ways of disposing of e-waste must be promoted amongst households & companies to educate in ways of disposing waste in a responsible manner.
- Further awareness must be created to inform household/public of recycling companies that are currently recycling e-waste in their area & to what standards/legislation these companies must comply to be seen as a responsible e-waste recycler.



CONCLUSION

- Industry associations can play important role in auditing & certification of facilities by verifying compliance to various acts mentioned in the study.
- Recycling companies, implement training programs on legislation & guidelines for proper disposal of e-waste to assist companies to comply to requirements of national waste regulations.
- Guideline & training programs can assist companies to develop responsible recycling methods & facilities that may comply to ISO 14001 standards.
- Compliance & certification could open doors for importation of e-waste to environmentally responsible recycling companies to extract valuable material in return for profits while reducing the impact that e-waste has on the environment.



CONCLUSION

- SA companies has a well developed value chain to successfully recycling e-waste from households, businesses & landfills.
- Capacity to process e-waste is not the main hurdle companies have to face, but access to e-waste that contains valuable material
- Improved awareness programs & training will in future increase e-waste stream to recyclers thus reducing its impact on landfills & the environment.



CONCLUSION

- Challenge in the proper management of e-Waste is a lack of recycling infrastructure, inadequate funding, poor legislation, a lack of public awareness and market based instruments.
- The SA government noticed that the e-waste sector can be a catalyst for socio-economic development. It is the source of new businesses and jobs as well as an important contributor to attaining its goals of a cleaner, greener South Africa





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