RONGO UNIVERSITY SCHOOL OF INFOCOM; Bsc. Informatics Year 3.1

UNIT: Green Computing

Presented By: Ms. Tabitha N.

Objectives

- Identify the various sources of e-waste
- Identify the hazardous components of e-waste
- Establish the occupational and environmental impact of e-waste.
- Understand the importance of effective e-waste management on sustainability.
- Determine the best e-waste management and disposal options.
- Establish the economic benefits of e-waste.
- Demonstrate an understanding of e-waste standards and regulations

Presented By: Ms. Tabitha

Content

- Overview; Introduction to electronic waste management
- Sources of e-waste; E-waste classification.
- Comparison of e-wastes and other solid waste.
- E-waste and environment
- E-waste management and disposal methods.
- E-waste legal frameworks.
- Basel convention and Tran boundary movement of e-waste.
- Extended producer responsibility, sustainable e-production and use.
- Case studies

Presented By: Ms. Tabitha

Introduction

- Electronic waste or E-waste describes discarded electrical or electronic devices or appliances that have ceased to be of any value to their owners.
- E-waste includes electronics which are destined for reuse, resale, salvage, recycling, or disposal.
- Often, the toxic material is improperly disposed and thus poses a threat to human health and the environment.

Presented By: Ms. Tabitha

Sources of E-Waste

- The objective of this section is to understand different types of electrical and electronic equipment so that they may be disposed of appropriately through sorting, collection, dismantling, treatment and disposal.
- There are two broad categories of ewaste based on (This is the classification)

i)mode of operation and function

ii) based on elemental composition.

Categorization based on mode of operation and function

- The classification of equipment is based on the mode of operation and function. It reveals the composition of physical components before dismantling in order to facilitate sorting.

Presented By: Ms. Tabitha

- Type of e-waste and Examples of equipment
- ICT and Telecommunications equipment Mainframes, Printers, Personal computers (CPU, mouse, screen and keyboard included), Laptop computer, Networking equipment, Scanners, Mobile phones, CD / DVDs / Floppy Disks, UPSs, Radio sets, Television sets, Video cameras, Video recorders, Hi-fi recorders, Audio amplifiers and Musical instruments.
- Office electronics Photocopying equipment, Electrical and electronic typewriters, Pocket and desk calculators, Facsimile and Telephones.
- Large Household Appliances Refrigerators, Freezers, Washing machines, Dish washing machines, Cooking equipment, Microwaves, Electric heating appliances, Electric hot plates, Electric radiators, Electric fans, Air conditioner appliances, exhaust ventilation and conditioning equipment, large appliances for heating beds, rooms and seating furniture.
- Small Household Appliances Vacuum cleaners, Carpet sweepers, Water dispensers, Toasters, Fryers, Appliances for hair-cutting, hair drying, brushing teeth, shaving and massage; Electric knives, Clocks, Appliances used for sewing, knitting and weaving.
- Consumer Equipment. Equipment for turning, milling, sanding, grinding, sawing, cutting, shearing, drilling, punching, folding, bending or processing wood, metal and other materials. Tools for riveting, nailing or screwing or removing rivets, nails, screws or similar uses, Tools for welding, soldering or similar use. Tools for mowing or other gardening activities, Sewing machines etc.

Presented By: Ms. Tabitha

- Toys, leisure and sports equipment Electric trains or car racing sets, Hand-held video game, Video games, Computers for biking, diving, running, rowing, etc., Sports equipment with electric or electronic components.
- Lighting Fluorescent tubes, Compact fluorescent lamps, High intensity discharge lamps, including pressure sodium lamps and metal halide lamps; Low pressure sodium lamps, Other lighting or equipment for the purpose of spreading or controlling light with the exception of filament bulbs.
- Medical equipment Scanners, Operating equipments, Stethoscopes, Radiotherapy equipment, Cardiology, Dialysis, Pulmonary ventilators, Nuclear medicine equipment, Laboratory equipment for in-vitro diagnosis, Analysers, Freezers, Fertilization tests. Other appliances for detecting, preventing, monitoring, treating, alleviating illness, injury or disability.
- Automatic dispensers Automatic dispensers for hot drinks, Automatic dispensers for hot or cold bottles or cans, Automatic dispensers for solid products, Automatic dispensers for money, and other appliances which deliver automatically all kind of products.
- Monitoring and control instruments Smoke detectors, Heating regulators, Thermostats, Measuring, weighing or adjusting appliances for household or as laboratory equipment and other monitoring and control instruments used in industrial installations (e.g. in control panels).
- Batteries Lead Batteries, Nickel and Cadmium batteries etc.

Presented By: Ms. Tabitha

Categorization based on element composition

- This category is based on the physical, chemical and gaseous components found in the electrical and electronic appliances.
- They include epoxy resins, fiber glass, Polychlorinated biphenlys (PCBs), (polyvinyl chlorides) (PVC), chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), thermosetting plastics, lead, tin, copper, silicon, beryllium, carbon, iron and Aluminium. They also vary in quantity: 4.2.1 Elements found in small amounts
- They include cadmium, mercury, and thallium. 4.2.2 Elements found in trace amounts They include americium, antimony, arsenic, barium, bismuth, boron, cobalt, europium, gallium, germanium, gold, indium, lithium, manganese, nickel, niobium, palladium, platinum, rhodium, ruthenium, selenium, silver, tantalum, terbium, thorium, titanium, vanadium, and yttrium etc.

Presented By: Ms. Tabitha

Categorization based on element composition

- This category is based on the physical, chemical and gaseous components found in the electrical and electronic appliances.
- They include epoxy resins, fiber glass, Polychlorinated biphenlys (PCBs), (polyvinyl chlorides) (PVC), chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), thermosetting plastics, lead, tin, copper, silicon, beryllium, carbon, iron and Aluminium. They also vary in quantity;
- Elements found in small amounts.

They include cadmium, mercury, and thallium.

- Elements found in trace amounts

They include americium, antimony, arsenic, barium, bismuth, boron, cobalt, europium, gallium, germanium, gold, indium, lithium, manganese, nickel, niobium, palladium, platinum, rhodium, ruthenium, selenium, silver, tantalum, terbium, thorium, titanium, vanadium, and yttrium etc.

Almost all electronics contain lead and tin (as solder) and copper (as wire and printed circuit board tracks), though the use of lead-free solder is now being promoted all over the world. These substances can be divided further based on their level of toxicity to humans and the environment.

Presented By: Ms. Tabitha

Categorization based on element composition

- This category is based on the physical, chemical and gaseous components found in the electrical and electronic appliances.
- They include epoxy resins, fiber glass, Polychlorinated biphenlys (PCBs), (polyvinyl chlorides) (PVC), chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), thermosetting plastics, lead, tin, copper, silicon, beryllium, carbon, iron and Aluminium. They also vary in quantity;
- Elements found in small amounts.

They include cadmium, mercury, and thallium.

- Elements found in trace amounts

They include americium, antimony, arsenic, barium, bismuth, boron, cobalt, europium, gallium, germanium, gold, indium, lithium, manganese, nickel, niobium, palladium, platinum, rhodium, ruthenium, selenium, silver, tantalum, terbium, thorium, titanium, vanadium, and yttrium etc.

Almost all electronics contain lead and tin (as solder) and copper (as wire and printed circuit board tracks), though the use of lead-free solder is now being promoted all over the world. These substances can be divided further based on their level of toxicity to humans and the environment.

Presented By: Ms. Tabitha

Hazardous elements

This category includes those elements that are harmful to the environment and human health;

Americium; Smoke alarms (radioactive source).

Mercury ; Fluorescent tubes (numerous applications); tilt switches (pinball games,mechanical doorbells, thermostats).

Sulfur; Lead-acid batteries.

Cadmium; Light-sensitive resistors, corrosion-resistant alloys for marine and aviation environments and nickel-cadmium batteries.

Lead; Old solder, CRT monitor glass, lead-acid batteries and formulations of PVC.

Beryllium oxide; Filler in some thermal interface materials such as thermal grease used on heat sinks of CPUs and power transistors, magnetrons, X-ray-transparent ceramic windows, heat transfer fins in vacuum tubes, and gas lasers

Polyvinyl chloride; PVC contains additional chemicals to change the chemical consistency of the product. Some of these additives can leach out of vinyl products e.g. plasticizers that are added to make PVC flexible.

Presented By: Ms. Tabitha

Generally non hazardous elements

- This category includes materials that are not harmful. They can be extracted from the used electrical and electronic appliances and applied elsewhere. They include;
- Tin Solder; coatings on component leads.
- Copper; Copper wire, printed circuit board tracks, component leads.
- Aluminium; Nearly all electronic goods using more than a few watts of power, including electrolytic capacitors.
- Iron Steel; chassis, cases, and fixings.
- Germanium: 1950s–1960s transistorized electronics (bipolar junction transistors).
- Silicon; Glass, transistors, ICs, printed circuit boards.
- Nickel; Nickel-cadmium batteries.
- Lithium; Lithium-ion batteries.
- Zinc; Plating for steel parts.
- Gold; Connector plating, primarily in computer equipment.

Presented By: Ms. Tabitha

Q & A

- Any questions?
- Let’s meet in the next class.

Presented By: Ms. Tabitha