

# **E-waste management**

## **Definition**

- Electronic Waste or E-Waste describes rejected electrical or electronic devices. All items of electrical and electronic equipment and its parts that have been discarded by the user as waste without the purpose of re-use or re-cycle is called Electronic Waste.
- Stored used electronics are also considered E-Waste. Improper processing of E-Waste can lead to dangerous human health effects and environmental pollution.

# **Types of Electronic Waste**

- **ICT and Telecommunications Equipment**

Items classified into ICT include CPUs, screens, monitors, mice, printers, keyboards, networking equipment, laptops, audio amplifiers, CDs, DVDs, and video cameras. And this number is arguably the most in the current era because it is the easiest to obtain.

- **Office Electronics**

Office use and the amount of trash in the world seem to be a problem. Office electronics include calculators, photocopying equipment, electronic, typewriters, telephones, fax machines, and facsimiles if they are still in the office.

- **Large Household Appliances**

Let's see first what electronic items are in large sizes in your home. You could say everyday items such as freezers, cookers, air conditioners, radiators, fans, and many more. And it is classified as **electronic waste** in a large size.

- **Small Household Appliances**

If it was a large one, now try to imagine small items also included in electronic devices. These are things like hair dryers, fryers, swing weaving, and many more. And this also consists of a lot.

- **Consumer Equipment**

Items used for consumer use will also be included in the **electronic waste** sector. This category for consumers is all forms of activity that will be important to serve consumers. Many activities fall into this category.

- **Medical Equipment**

And there are still many who are not aware that this waste is also included in medical matters. If this is added up, it can be calculated how much the amount of waste is. So, electronic equipment is involved in injury, treatment, prevention, and detection activities.



- **Toys Leisure and Sports Equipment**

As kids grow older, of course, there are toys or games that they no longer use. And there must be some of those items that belong to electronics. If there is only one electronic component, such as a battery, in the toy, then it is classified as e-waste as well.

## Sources of E-Waste

- Any appliance that runs on electricity has the potential to cause damage to the environment if it is not disposed properly. Common things of electrical and electronic waste are:
- Large household appliances like refrigerators/freezers, washing machines, dishwashers, televisions.
- Small household appliances which include toasters, coffee makers, irons, hairdryers.
- Information Technology (IT) and Telecommunications equipment namely personal computers, telephones, mobile phones, laptops, printers, scanners, photocopiers etc.
- Lighting equipment such as fluorescent lamps.
- Electronic or Electrical tools i.e. handheld drills, saws, screwdrivers etc.
- Toys, leisure and sports equipment.
- Monitoring and control instruments.
- Automatic dispensers.

## Composition of E-Waste

- Composition of E-Waste includes materials like:
- Valuable metals like gold, platinum, silver and palladium.
- Useful metals like copper, aluminium, iron etc.
- Hazardous substances like radioactive isotopes and mercury.
- Toxic substances like PCB's and Dioxins.
- Plastic like High Impact Polystyrene (HIPS), Acrylonitrile Butadiene Styrene (ABS), Polycarbonate (PC), Polyphenylene oxide (PPO) etc.
- Glass material like Cathode Ray Tube glass made up of  $\text{SiO}_2, \text{CaO}, \text{Na}$ .

For instance, a mobile phone contains more than 40 elements, base metals such as Copper (Cu) and Tin (Sn), special metals such as Lithium (Li), Cobalt (Co), Indium (In) and Antimony (Sb) and precious metals such as Silver (Ag), Gold (Au), and Palladium (Pd).

- Among the most common substances found in these discarded items are cadmium, lead, lead oxide, antimony, nickel and mercury. These toxic elements pollute rivers, lakes and seas, and release gases into the atmosphere that upset ecosystems.

Components	Constituents	Affected body parts
Printed circuit boards	Lead & Cadmium	Nervous system and Kidney
Motherboards	Beryllium	Lungs and Skin
CRT (Cathode Rode tube)	Lead oxide, barium and cadmium	Heart, liver and muscles
Flat screen monitors	Mercury	Brain and skin
Computer	Cadmium	Kidney and liver
Cable insulating	PVC(Polyvinyl Chloride)	Immune system
Plastic housing	Bromine	Endocrine system

# The Countries Producing the Most E-Waste

The countries which produced the most e-waste per capita in 2019



Source: Global E-Waste Monitor 2020



Rank	Country	E-Waste Produced (Kt)	Recycling Rate
1	China	10129	16%
2	USA	6918	15%
3	India	3230	1%
4	Japan	2569	22%
5	Brazil	2143	0%
6	Russia	1631	6%
7	Indonesia	1618	n/a
8	Germany	1607	52%
9	UK	1598	57%
10	France	1362	56%

## Key Facts

- **57.4 Mt** (Million Metric Tonnes) of e-waste was generated in 2021. The total is growing by an average of 2 Mt a year.
- There is over **347 Mt** of unrecycled e-waste on earth in 2023.
- **China**, the **US**, and **India** produce the most e-waste.
- Only **17.4%** of e-waste is known to be collected and properly recycled.
- **Estonia**, **Norway**, and **Iceland** have the highest e-waste recycling rates.
- The e-waste recycling market was valued at **\$49,880 million** in 2020.



## **How much E-Waste is Produced Each Year?**

- It is estimated that 57.4 Mt (Million Metric Tonnes) of e-waste was generated globally in 2021.
- There has been an increase year on year since e-waste data started being collected in 2014.

## **Will E-Waste Continue to Increase in the Future?**

- On average, the global e-waste generation has increased by 2 Mt annually over the last decade.
- Global electronic waste volume is projected to grow to 74.7 Mt by 2030 – meaning it will have almost doubled in only 16 years.

## **Which Region Produces the Most E-Waste by Volume?**

- Asia (24.9 Mt), the Americas (13.1 Mt) and Europe (12Mt) produced the overwhelming majority of E-Waste when measured by total weight.

## **Which Region Produces the Most E-Waste per Capita?**

- When measured per capita, Europeans (16.2 Kg) produce the most e-waste per person, followed by Oceania (16.1 Kg) and the Americas (13.3 Kg).
- African residents produce the least amount of e-waste per capita.

## **What Percentage of Electronic Waste Is Recycled?**

- Less than 1/5 is recycled globally, although this varies by region.
- Only 17.4% of total global e-waste is known to have been collected and properly recycled. This figure has fallen in the last 5 years as a percentage of total waste generated.

## **Europe Recycles The Highest Percentage of E-Waste**

- Europe has by far the highest collection and recycling rate at 42.5%. Asia, in second place, had a rate of just 11.7%. Africa has the lowest at just 0.9%.

## **Which Country is Best in E-waste Recycling?**

- Estonia, Norway, and Iceland have the best electronic waste recycling rates in terms of the percentage of waste that each country produces, according to the latest available data.

## **Valuable Raw Materials Are Lost**

- There are several high-value raw materials in e-waste, including gold, silver, copper, and iron.
- Recycling just one million used cell phones can recover as much as 772lbs of silver, 35,000lbs of copper, 75lbs of gold, and 33lbs of palladium.
- It is estimated that the 53.6 Mt of e-waste generated in 2019 contained raw materials worth around \$57 billion.



## **E-Waste Is Not Biodegradable**

- E-waste does not biodegrade, and therefore will accumulate wherever it is dumped, in much the same way that plastic waste does.
- Over time, any greenhouse gases contained within the e-waste will slowly be released into the atmosphere.

- **E-Waste Pollutes the Environment With Hazardous Substances**
- The toxic materials such as mercury and BFR plastics that are found in e-waste have a negative effect on the environment and health of people or animals that come into contact with it.
- When disposed of improperly, these chemicals can be released indefinitely into the air, soil or water which is detrimental to ecosystems as well as human populations.

# **Sources of E-waste**













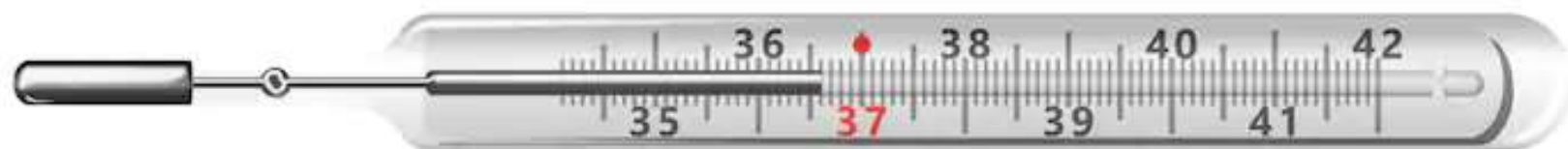






# **Components of E-waste**





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**Evaporating Coil**



