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Reuse and recycling of e-waste towards resource security and sufficiency economy

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Electronics industry

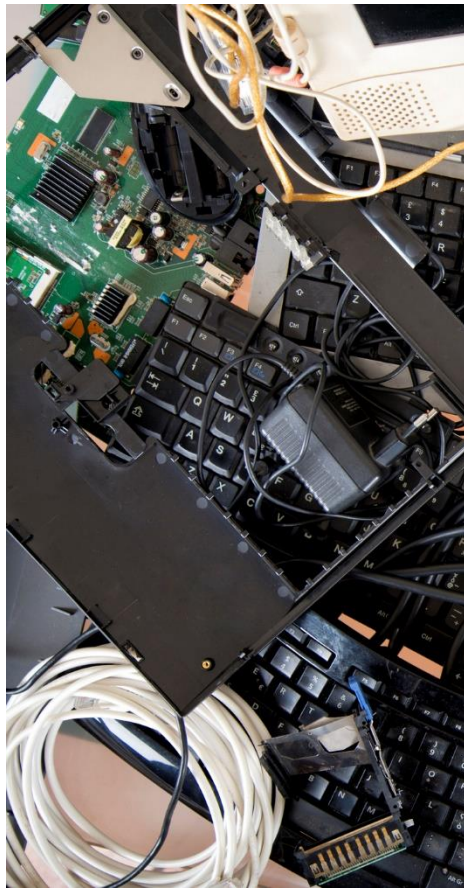
- The electronics industry, one of the most important industries in the world, has grown steadily in recent decades, generates a great number of jobs, promotes technological development and, at the same time, fuels a high demand for raw materials that are considered scarce or rare (e.g. precious metals and rare earths elements).

- This development affects the environment in two ways:

➢ first through the extraction of natural raw materials to supply the demand of the new equipment industry and

➢ second through the large and growing amount of equipment that is discarded annually (e-waste).

E-waste



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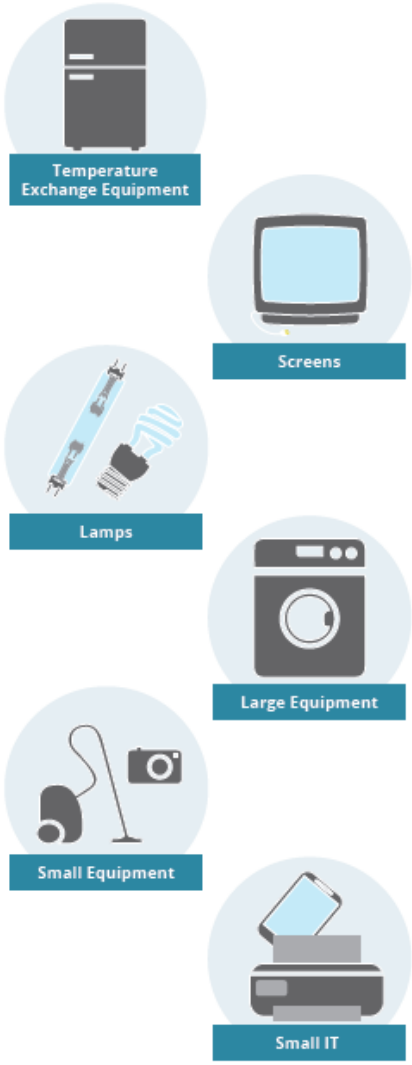
What is e-waste?

- Electronic waste, or e-waste, refers to all items of electrical and electronic equipment (EEE) and its parts that have been discarded by its owner as waste without the intent of re-use.

- It includes a wide range of products:
  - Temperature exchange equipment
  - Screens
  - Lamps
  - Large equipment
  - Small equipment
  - Small IT



Source: Baldé et al., 2015a

Global e-waste generation

- **44.7 million** metric tonnes of e-waste were generated in 2016. This is an equivalent of approximately 4,500 Eiffel towers.
- The amount of e-waste is expected to increase to **52.2 million** metric tonnes by 2021.

- The consumption of EEE in general has shown rapid growth over the period of 2000 to 2016. Emerging economies with a low Purchasing Power Parity (PPP) have shown the fastest annual growth rates in EEE consumption.

Purchasing Power Parity range (USD/inh. in 2016)		Average growth rate per year
Highest PPP	> 34000	1.6%
High PPP	34000 - 15280	5.2%
Mid PPP	15280 - 6740	13%
Low PPP	6740 - 1700	23%
Lowest PPP	< 1700	15%

Average annual growth rate of EEE per group of countries, by Purchasing Power Parity, Source – Global E-Waste Monitor 2017

E-waste reuse and recycling potential

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- E-waste often contains precious metals such as gold, copper and nickel and rare materials of strategic value such as indium and palladium. These precious and heavy metals could be recovered, recycled and used as valuable source of secondary raw materials.

- For instance, printed circuit boards (PCBs), present in all types of electronic equipment, are of major interest because they contain secondary raw materials that are rich in copper and precious metals such as gold, silver and palladium.

- For example, a single mobile phone can contain high concentrations of gold (24 mg), silver (250 mg) and palladium (9 mg).

- When compared to the average contents of the primary sources (minerals), these values reveal a secondary source of high metal concentration. This stimulates the recovery of these metals, ensuring metallic resources for future use and avoiding all environmental impacts related to their primary extraction.

E-waste reuse and recycling potential

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- A large variety of valuable materials and plastics are contained in electric and electronic appliances. Up to 60 elements from the periodic table can be found in complex electronics, and many of them are technically recoverable, though there are economic limits set by the market.

- E-waste contains precious metals including gold, silver, copper, platinum, and palladium, but it also contains valuable bulky materials such as iron and aluminum, along with plastics that can be recycled.

- Data from the Global E-Waste Monitor 2017 estimates that the resource perspective for secondary raw materials of e-waste is worth **55 Billion €** of raw materials.

Material	kilotons (kt)	Million €
Fe	16,283	3,582
Cu	2,164	9,524
Al	2,472	3,585
Ag	1.6	884
Au	0.5	18,840
Pd	0.2	3,369
Plastics	12,230	15,043

Potential value of raw materials in e-waste in 2016, Source – Global E-Waste Monitor 2017

E-waste in the Basel Convention

- The Basel Convention deals with the control of transboundary movements of hazardous waste and its deposits provides that hazardous waste must be disposed of in the country of origin.

- E-waste is categorized as hazardous waste under the Basel Convention due to the presence of toxic materials such as mercury, lead and brominated flame retardants.

- The Basel Convention started to address e-waste issues in 2002 which include, among others, environmentally sound management; prevention of illegal traffic to developing countries and; building capacity around the globe to better manage e-waste.

E-waste and the SDGs

- E-waste, when treated inadequately, poses serious health issues since it contains hazardous components, including contaminating air, water, and soil, and putting people's health at risk.
- Dismantling processes that do not utilize adequate means, facilities, and trained people pose additional threats to people and the planet.
- A better understanding and more data on e-waste can contribute to the achievement of several of the SDGs. It will help address the SDGs related to environmental protection and health.
- It will also address employment and economic growth, since the sound management of e-waste can create new areas of employment and drive entrepreneurship.

A better understanding and management of e-waste is closely linked to the following SDGs

Status quo

- Though the amounts of e-waste continue to grow, very little is currently being recycled. In 2016, the world generated 44.7 million metric tonnes of e-waste and only 20% was recycled through appropriate channels.

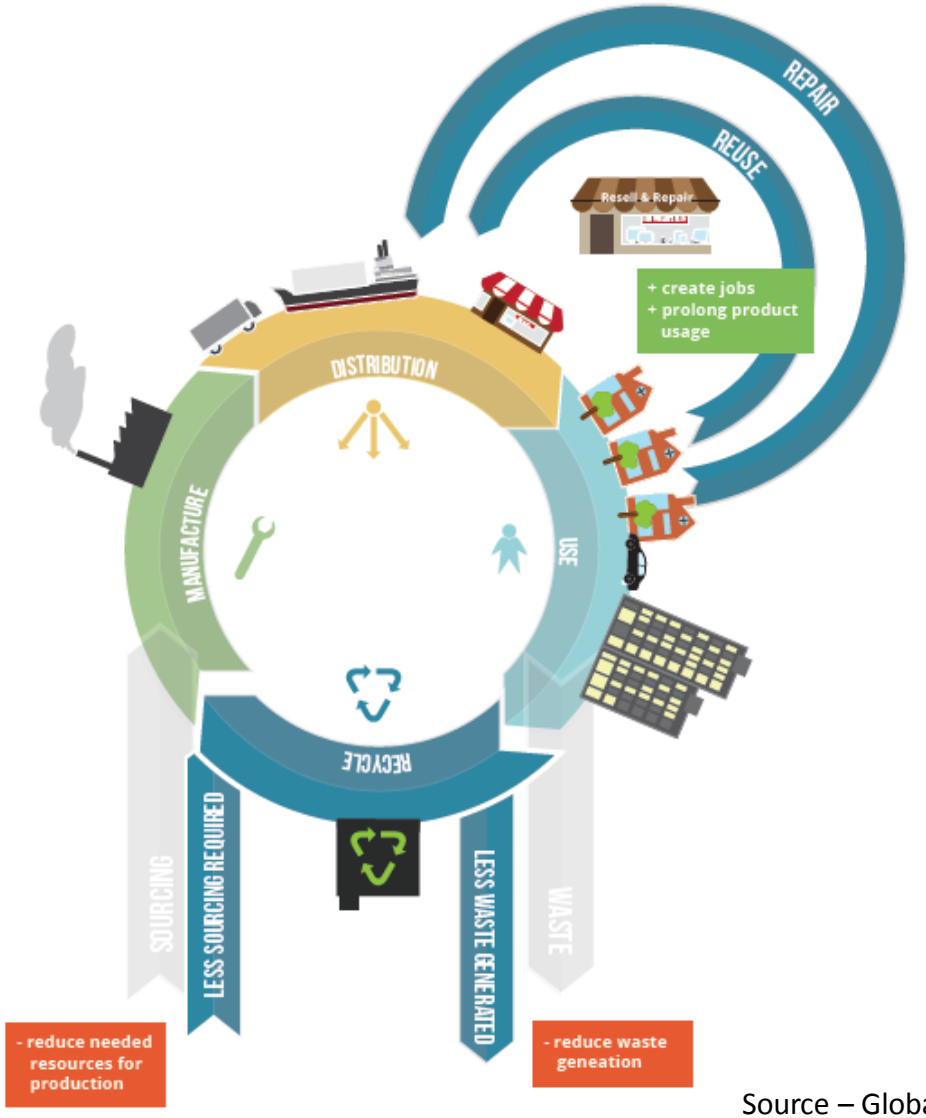
- Although 66% of the world's population is covered by e-waste legislation, more efforts must be made to enforce, implement, and encourage more countries to develop e-waste policies.

- There is currently a lack of reliable e-waste data at the country level. Often, merely anecdotal evidence is available on the production, management, and recycling of e-waste, and only 41 countries in the world collect international statistics on e-waste.

Going circular – urban mining of e-waste

- Looks at products and waste - covers the whole life cycle of a product: from production and consumption to waste management and the secondary materials market.

- Focuses first on waste prevention (products), second on preparation for re-use and recycling (waste).



Source – Global E-Waste Monitor 2017

Going circular towards a sufficiency economy

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- The sufficiency economy concept puts sustainability at its core.

- Moving away from the "take, make and dispose" extractive industrial model, to a system that is restorative and regenerative by design.

- The following circular economy principles can be applied to e-waste management to move towards a sufficient economy:
  - Extended Producer Responsibility schemes
  - Research into product design to facilitate reuse, repair, remanufacture and recycling
  - Improve policies/legislation
  - Awareness raising

Summary

- E-waste is set to continue to grow in the future, therefore, it is important to soundly and sustainably manage this waste stream.
- You can’t manage and monitor what you don’t know - need for data and statistics - better data is an important step towards addressing the e-waste challenge.
- Statistics can help to evaluate developments over time, set and assess targets, and identify best practices of policies.
- Sound management of e-waste can contribute to:
  - minimizing e-waste generation;
  - preventing illegal dumping and improper treatment of e-waste;
  - promoting recycling and recovery of secondary raw materials;
  - and creating jobs in the refurbishment and recycling sector.

Thank you!

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