Computer: The Problem Of E-Waste

Introduction

The Computer is a device that has evolved and changed in many ways. The Kenbak-1, released in early 1971, is the world's first personal computer. ('History of personal computers', 2020).

The first laptop or portable computer. The computer weighed 55-pounds and had a five-inch CRT display, tape drive, 1.9 MHz PALM processor, and 64 KB of RAM. Now. All Macs being sold today have at least 2 gigabytes (GB) of memory installed. If you need more RAM in your Mac, you can upgrade it ('See How Much RAM is Installed in Your Mac | Macinstruct', 2020). Apple manufactures the MacBook Pro as a 13-inch or 15-inch laptop, with diagonal measurements of 13.3 inches and 15.4 inches. They have a height of 0.95 inches. The width and depth of the 13-inch version are 12.78 inches and 8.94 inches, respectively ('The Size of a MacBook', 2020). Computers are electrical devices with batteries which means they produce E-waste..

E-waste

E-waste (electronic waste) refers to any item with a plug, battery or cord that is no longer working wanted ('What is e-waste?', 2020).

This means that computers produce E-waste. The world generates around 40 million tons of electronic waste every year, worldwide. That's like throwing 800 laptops every second ('The World Counts', 2020). One of the major components of E-waste from computers is metals that come from minerals

- Metals and Minerals
- Metal Part of Computer
- gold Circuit boards
- copper Circuit boards, wires, chips
- Aluminium Hard disk platter

There are metals in computers. The three most present metals in computers are Aluminium, Gold and Copper. Aluminium is a good choice for the hard disk platter since it's light and non-magnetic, but hard disks need to be robust and aluminium isn't hard enough by itself. Instead, the material used is an alloy of aluminium and magnesium (pro, 2020). Gold is an excellent conductor; it doesn't tarnish or corrode like copper and silver, and so can be used in very thin layers to reliably conduct small currents. Its main use in computers is at contact points where oxidation would be more of an issue for other metals like at circuit boards. ('From the ground to a computer… How is the MacBook made? Part 1 | MultITGS', 2020). Copper is used for the most powerful computer chips. Because of copper's electrical conductivity, this technology enables conductor channel lengths and widths to be significantly reduced.`

Aluminium ore is called bauxite. The bauxite is purified to produce aluminium oxide, a white

powder from which aluminium can be extracted. Aluminium is used because it is the third most common element on the planet and is light and magnetic ('Extracting metals using electrolysis - What are electrolytes and what happens in electrolysis? - OCR 21C - GCSE Combined Science Revision - OCR 21st Century - BBC Bitesize', 2020). Copper ore can be extracted from its ore by: Underground: sinking a vertical shaft into the Earth to an appropriate depth and driving horizontal tunnels into the ore ('Copper Facts: Electronics', 2020). Copper is used because of its electrical conductivity. Gold ore is extracted by leaching dissolves the gold out of the ore using a chemical solvent. The most common solvent is cyanide, which must be combined with oxygen in a process known as carbon-in-pulp (Garden et al., 2020). Gold is used because of its highly efficient conductor that can carry tiny currents and remain free of corrosion. Getting these metals and ore has negative impacts on the environment.

Environmental Impacts

There are environmental effects from mining gold, copper and aluminium to make computers.

Gold mining has ravaged landscapes, contaminated water supplies, and contributed to the destruction of vital ecosystems. Cyanide, mercury, and other toxic substances are regularly released into the environment due to gold mining ('Brilliant Earth', 2020). The major environmental impact of refining and smelting aluminium is greenhouse gas emissions. Sulphur dioxide and sodium fluoride are emitted from smelters and electrical plants. Terrestrial copper mining involves significant and often permanent ecological impact. Invariably, the local biodiversity, surface water and groundwater are impacted. Land covers from forests to wetlands and from deserts to coral reefs are often severely and perhaps irreversibly degraded (2020).

Most computers are sent to landfills or incinerated, which releases materials such as lead, mercury, or cadmium into the soil, groundwater, and atmosphere, thus having a negative impact on the environment.

let's say most aluminium smelters are consuming electricity at 14,500-15,000 kWh/ton of ingot produced. With the LME at $1,300/metric ton, that means electricity should be costing a typical smelter $0.029/kWh (Burns, 2020). The cost of extracting an ounce of gold is actually over $1,000 per ounce ('How Much Does it Cost to Produce an Ounce of Gold?', 2020). All-in sustaining production costs, an industry benchmark, are forecast between $2.55 and $2.85 per pound of copper for 2018 ('Barrick clips 2018 copper production outlook, sees higher costs', 2020). Mining and smelting of these metals have a negative impact on the environment and most are usually recyclable.

Recycling

Recycling is an efficient strategy to deal with E-waste. Many materials used in computer hardware can be recovered by recycling for use in future production ('Computer recycling', 2020). 60% of aluminium is recycled and this is a main component of personal computers. ('Why You Should Recycle Aluminum', 2020). Gold can be recycled with no degradation in quality, so gold originally mined centuries ago is just as good as new ('Can recycling gold help the metal regain its luster?', 2020). Copper by itself or in any of its alloys is completely recyclable and can be processed over and over again with no loss of quality. Excluding wire production ('Copper', 2020).

Aluminium. Recycling of aluminium cans saves 95% of the energy required to make the same amount of aluminium from its virgin source. Recycling copper uses much less energy, about 10GJ/tonne, that's only 10% of the energy needed for extraction.

A way to recycle metals and minerals is to put your materials into recycling centres located in Helensvale Merrimac and Mudgeeraba recycling centres which have the capacity to break down a laptop into its part into elements that can be reused. These recycling centres can be accessed at 830am to 5pm.

Ace Extension

The size of the computer has changed drastically since its release in 1971. The old personal computer would sell for $3000. This shows that it was harder to manufacture and produce

Conclusion

In conclusion, it is clear that E-waste is produced on a mass scale and the world is not recycling enough these problems need to be fixed. To fix these problems it is possible for the governments to produce more recycling centres so that people have access and will be more inclined as they do not have to travel as far. Also people need to familiarise themselves with the local recycling centres and where and how to dispose of them. If the E-waste problem is not addressed this could cause mass greenhouse gas emissions and speed up climate change drastically.