



E-WASTE

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YEE is a platform that connects 43 youth organisations from all over Europe. YEE activities aim to promote sustainable development, environmental protection and nature conservation.

All YEE activities are organised and carried out by and with the involvement of young people under the age of 30.

European Voluntary Service (EVS) is a programme that gives young people the opportunity to spend up to 12 months abroad as volunteers helping in local projects in various fields. In this way, it seeks to develop solidarity, mutual understanding and tolerance among young people, thus contributing to reinforcing social cohesion in the European Union and to promoting young people's active citizenship.

European Voluntary Service is funded by the Erasmus+ programme of the European Union.



Co-funded by the
Erasmus+ Programme
of the European Union

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INTRODUCTION



Can you imagine your life without electronic devices? We use them everyday, every hour – for work, entertainment and studying. The devices make our daily life easier: we can now communicate with our families and friends even if they are far away, get information and news whenever and wherever. By helping us, the devices leave us more free time. It is hard to argue that electronics give us a wide range of possibilities and we got used to them fast.

High technology is developing with an extremely high speed. As soon as they appeared on the mass market, gadgets and appliances became a part of lifestyle or a symbol of wealth.

Striving to monopolize the biggest part of the market and be the leading seller of electronic products, global technology companies announce new series of phones, computers, laptops, tablets, smart watches and more items almost every month. What will happen then? New arrivals make us believe that old working gadget is no longer desirable or useful. As a result, many people replace old functioning gadgets with new ones. Plus some electronic products simply do not last as long as they should and it is cheaper to replace them than to fix. So electronic devices promote overconsumption, but it is not the only problem. The cost of constantly trying to keep up to date with the latest electronics is definitely high for a household budget. There is also an enormous environmental cost. Our addiction to new electronic gadgets brings new problems for environment. In the last 10-20 years we have been facing another environmental problem: **e-waste**.

In this small booklet you can read about what e-waste is, the types of e-waste, overview of its disposal. At the end you can also find the useful tips on how you can deal with e-waste in the most sustainable way.

Diana Podgurskaia

WHAT IS E-WASTE?

PLEASE DESTROY CELL
PHONES BEFORE ENTERING



The term “**e-waste**” covers almost all items of electrical and electronic equipment (EEE) that have been discarded by its owner as waste. E-waste includes a wide range of products – almost any household or business item with electrical components or battery supply.

It is important to mention that large number of what is labeled as "e-waste" is actually not waste at all, but rather whole electronic equipment or parts that can be reused or recycled for materials recovery.

Categories of e-waste.

According to the size, material composition and quantities e-waste can be divided into six categories {1}:

Temperature exchange equipment - usually cooling and freezing equipment (refrigerators, freezers, air conditioners).

Screens, monitors - televisions, monitors, laptops, notebooks, and tablets.

Lamps - straight lamps and LED lamps

Large equipment - washing machines, clothes dryers, dishwashing machines, electric stoves, large printing machines, copying equipment and photovoltaic panels.

Small equipment. The biggest group of e-waste includes vacuum cleaners, microwaves, ventilation equipment, toasters, electric kettles, electric shavers, scales, calculators, radio sets, video cameras, electrical and electronic toys, small electrical and electronic tools, small medical devices, small monitoring and control instruments.

Small IT and telecommunication equipment - mobile phones, GPS, pocket calculators, routers, personal computers, printers, telephones).

Each category has different material composition, economic values, as well as potential environmental and health impacts through inappropriate recycling. Therefore, the collection, logistic means and recycling technology need to be different for each category.

1 <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32012L0019>

RECYCLING PROBLEMS



We are used to recycle plastic, paper, glass, carton and cans. In some places we can find compost bins. We separate waste almost automatically, as it does not require too much effort: in many countries recycling bins are widespread and easy to find.

But how many of us recycle electronic appliances? The majority of people know that we cannot just toss them to a trash bin. In some countries it is even prohibited by legislation. But the problem is that in some regions and countries it is not that easy to get rid of broken or unwanted appliances without harming nature.

E-waste is the fastest growing part of the waste stream: from 33.8 million tons in 2010 to 41.8 million tons in 2014. Expected growth percentage is 4-5% yearly and by 2018 total amount is expected to compose 49.8 million tons {2}. With increasing number of e-waste, the problem of responsible recycling is becoming even more important.

Here is why:

- Some parts of e-waste include hazardous elements that can affect the environment and people's health;
- Discarded into mixed waste bin, electrical equipment cannot be sorted out and will end up in a landfill;
- Electrical equipment contains materials that can be used again (some appliances have the recovery ratio as high as 90%) so that natural resources can be saved.

The biggest issue with e-waste is a difficult process of recycling. It is known that all the appliances consist of numerous small parts, which are made from different materials. Some of them can be recycled but others can be highly poisonous and dangerous. The separation of valuable parts from hazardous and useless ones is a painstaking and very often dangerous process, made usually by hand by people in poor countries.

For now the possible ways of dealing with e-waste can be divided into hazardous and sustainable ways.

Hazardous ways:

Incineration or **Landfilling** - widely used methods of waste disposal.

Incineration and landfilling are highly dangerous, yet very widespread methods of dealing with e-waste. Burning e-waste poisons the air and affects respiratory system of humans. Electronics that end up in landfills definitely bring negative effects to soil, water bodies and humans.

Very often they contain harmful toxins including lead, mercury, arsenic, cadmium, chlorine and bromine, which can leak into the groundwater and accumulate in the food chain causing detrimental damage to the soil, water supply, vegetation, animals and humans {3}.

For instance:

- **lead** exposure can cause damage to the reproductive, blood and nervous systems;
- **mercury** exposure contributes to brain and kidney damage;
- **arsenic** – even low levels of exposure cause negative impact on skin, liver, nervous and respiratory systems;
- **cadmium** is associated with deficits in cognition, learning, behaviour and neuromotor skills in children. It has also been linked to kidney damage;
- **chlorine** exposure causes tissue damage and the destruction of cell structure;
- **bromine** contributes to the disruption in the thyroid hormone balance, brain damage and cancer.

Storage - very often people just store unwanted or broken appliances.

Inappropriate storage can also lead to dangerous circumstances. For example, broken LED lamps, that contain lead and arsenic, can affect a person's health. It is better to find a collection point. Very often they contain harmful toxins including lead, mercury, arsenic, cadmium, chlorine and bromine, which can leak into the groundwater and accumulate in the food chain causing detrimental damage to the soil, water supply, vegetation, animals and humans {3}.

For example, broken LED lamps, that contain lead and arsenic, can affect a person's health. It is better to find a collection point/company that will recycle appliances properly, but unless you find one, there are some tips how to store electronics:

- store e-waste in a way that protects it from the weather and from breakage;
- store e-waste in an area that is inaccessible to the public and children;
- store e-waste on-site for the maximum duration of one year only {4};
- make some research on how to handle e-waste to prevent breakage, and how to safely clean up any breakage that occurs.

Shipping outside the country - many tons of e-waste go to Asia and Africa.

Export of e-waste



Millions of tonnes of electronic waste ends up in Africa and Asia, legally and illegally. Greenpeace/BAN

Informal recycle markets in China, India, Pakistan, Vietnam, Indonesia and west Africa handle from 50 to 80 percent of the total amount of collected e-waste {5}. It is cheaper to ship e-waste to other countries than to recycle it in the country of origin. While it is difficult to evaluate the influence of e-waste toxins to health due to informal working conditions and poor sanitation, several studies in Guiyu (China) – which was known as the largest e-waste recycling site in the world – say that “city's residents exhibit substantial digestive, neurological, respiratory and bone problems. For example, 80 percent of Guiyu's children experience respiratory ailments, and are especially at risk of lead poisoning {6}”.

With active actions by local environmentalists and governmental programme aimed at clearing the sites from e-waste, Guiyu is now free from toxic piles of waste. This is one good example, but local people think that informal market will just move to another place. {7}

The same situation is in western Africa, where the city of Agbogbloshie, Ghana, plays the role of graveyard for e-waste.

4 <http://dnr.wi.gov/files/PDF/pubs/wa/WA1473.pdf>

5 <http://www.electronicstakeback.com/global-e-waste-dumping/>

6 <http://www.prb.org/Publications/Articles/2013/e-waste.aspx>

7 <https://www.revealnews.org/article/looks-are-deceiving-in-chinese-town-that-was-us-e-waste-dumping-site/>

People work there by hand and live in terrible health conditions, literally next to piles of hazardous waste. Health problems resulting from these hazardous waste affect humans by causing cancers, diabetes, alterations in neurochemical balances, endocrine disruptors, skin alterations, neurotoxicity, kidney damage, liver damage, bone disease, emphysema, reproductive damage, and a lot of other fatal diseases. The improper disposal of this hazardous waste creates fatal health problems, and is a serious public health risk {8}. Still, this work often is the only way for local residents to make a living.

Sustainable way - recycling.

The e-waste recycling process is highly labor intensive and goes through several steps.

- “**Picking Shed** - the first step involves sorting all the items manually. Batteries are removed for quality check.
 - **Disassembly** - the e-waste items are categorized into core materials and components and then separated into parts that can be reused or still continue the recycling process.
 - **Initial Size Reduction Process** – Here, items that cannot be dismantled efficiently are shredded into pieces as small as 100mm. It is done in preparation for further categorization of the finer e-waste pieces. This is also where the data destruction takes place.
 - **Secondary Size Reduction** – the small debris is shaken to ensure that it is evenly spread out on the conveyor belt, before it gets broken down even more. Any dust extracted is disposed of in an environmentally friendly way.
 - **Overband Magnet** – using magnets, steel and iron are removed from the debris.
- Metallic & Non-Metallic Content – aluminium, copper and brass are separated from the non-metallic content. The metallic can then be reused and resold as raw materials.
- **Water Separation** – water is used to separate plastic from the glass content. Once divided all raw materials can then be resold and reused. The products sold include plastic, glass, copper, iron, steel, shredded circuit boards, and valuable metal mix{9}.”

8 https://en.wikipedia.org/wiki/Global_waste_trade

9 <http://www.conserve-energy-future.com/e-waste-recycling-process.php>

WHAT TO DO?



More and more countries try to regulate the amount of e-waste with legislation and various governmental programmes.

Regarding the European Union, there is the EU Directive 2012/19/EU of the European Parliament and of the Council. This document determines the commitment of Member States to “adopt appropriate measures to minimise the disposal of WEEE (Waste Electrical and Electronic Equipment) in the form of unsorted municipal waste, to ensure the correct treatment of all collected WEEE and to achieve a high level of separate collection of WEEE...{10}”:

Each individual bears the responsibility of taking care of their e-waste. It is fully up to us how we will manage our e-waste. Solving the e-waste problem starts with education and habit changes as a result of knowledge.

So, what we can do?

Don't throw electronics to a trash bin! - Think twice before discarding your old gadget. If you think that finding a responsible recycling service is too complicated, remember that It takes 240 kg of fossil fuel, 22 kg of chemicals, and 1.5 tons of water to manufacture one computer and monitor.

Take part in government recycling scheme. Concerned about increasing amount of e-waste, governments not only adopt legislations that prohibit discarding e-waste to common waste, but more and more governmental schemes are appearing. Check if there are any in your country.

Before buying a product check if there is a take-back system provided by the company - most of big companies have take-back programs, which means that they commit to take care of the recycling of their own products. Usually they charge small amount of money or do it for free. You can check the schemes of some companies and conditions. Before buying try to do a small research and find out the policy of the company towards recycling.

Find a recycling service (some of them are free or charge a small fee). Below you can find a list of some companies in different countries. For sure, that list is not exhaustive, find a company near you!

Donate to charity. There are several projects that collect old gadgets. You can also donate large household appliances (if they still work) to someone who need it.

Be responsible - There are several ways to prevent growth of e-waste. First of all - responsible consumption. Before buying a new model of cell phone or TV, just think is it a real necessity?

You can also try to **repair** non-working gadget by yourself! You can do some research and find out that there are a lot of courses and teaching videos in Internet, like **this**, for example.

Useful links:

An example of governmental recycling scheme:

<http://www.environment.gov.au/protection/national-waste-policy/television-and-computer-recycling-scheme>

Examples of take-back schemes:

http://www.samsung.com/us/aboutsamsung/sustainability/environment/takebackrecycling/download/Regional_WEEE_Take-back_Schemes2.pdf

https://www.microsoft.com/about/csr/environment/sustainable_devices/recycling/

<https://www.apple.com/recycling/>

List of recycling services:

https://www.fairphone.com/wp-content/uploads/2016/09/022-01-EU-List-of-Recyclers_Sept_2016_DEF.pdf

An example of charity project:

<http://www.remobil.cz/en/>

INTERESTING FACTS

7 <https://www.revealnews.org/article/looks-are-deceiving-in-chinese-town-that-was-us-e-waste-dumping-site/>

"For every 1 million cell phones recycled, we recoup 16 tons of copper, 350 kg of silver, 34 kg of gold and 15 kg of palladium {11}".

"The “glass” in the LCD screen is made up of a layer of many kinds of liquid crystals. The liquid crystals are one of the most expensive materials in the TV. Can the LCD glass be recycled, to recover the liquid crystals? No, the “recommended” method of disposal of liquid crystals is incineration {12}".

"Plastics in e-waste can be recycled into garden furniture. Battery components can be reused in other batteries. Metals can be used in jewelry and automotive parts {13}".7

There are more mobile phones in existence than there are number of people living on Earth {14}.

12 <http://www.bbc.com/future/story/20161017-your-old-phone-is-full-of-precious-metals>

13 <http://www.electronicstakeback.com/green-design-vs-greenwashing-2/hard-to-recycle/>

14 <http://earth911.com/eco-tech/20-e-waste-facts/>

15 <http://www.ibtimes.co.uk/there-are-more-gadgets-there-are-people-world-1468947>

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