

| | |
|---------------|---|
| Forum: | United Nations Environment Programme (UNEP) |
| Issue: | The effects of hazardous electronic waste on the environment |
| Chair: | Ivan Wei (Head Chair), Chloe Lau (Deputy-Chair), Amanda Shen (Deputy-Chair) |

Introduction

In 2016, the world produced 49 million tons of electronic waste. That's equivalent to about 4,500 Eiffel Towers. However, only 20% of electronic waste was formally recycled. The rest either piled up in landfills or were informally recycled in developing countries. This number is only expected to grow to more than 57 million tons in 2021, according to a study by the United Nations University (UNU).

Over the last century, the electronics industry has transformed the world. Electrical and Electronic Equipment (EEE), ranging from washing machines, gaming consoles, and mobile phones, to hand sanitizer dispensers and their batteries, have contributed to modern life in sectors such as medicine, mobility, education, healthcare, food-supply, communications, security, and even environmental protection. However, the rapid expansion of technology devices and the cycle of consumption, especially with the recent introduction of the 5th Generation Mobile Network (5G), is leading to an ever-growing number of electronic waste. The concept is that as 5G compatible gadgets gain popularity, old products will become increasingly obsolete, leading to more tossups.

E-waste poses a major threat to human health and the environment, particularly in developing countries. Developed countries without a comprehensive recycling system often opt to send toxic waste to countries such as China, Ghana, and India. However, recycling systems in developing countries are usually informal and present several environmental and health hazards. In fact, only 25% of e-waste is recycled in formal recycling centers with adequate protection for staff. Likewise, most of the toxic substances in these recycling plants are released into the land, air, and water.

Definition of Key Terms

Electronic waste

The terms “electronic waste”, “e-waste”, “e-scrap” and “Waste Electrical and Electronic Equipment (WEEE)” are synonymous, and are used interchangeably in this chair report and discussion. Electronic waste comes from various forms of technology and electronic equipment that are no longer valuable, in use, or wanted for their original purpose due to either redundancy, replacement, or breakage and often include toxic heavy metals that harm the environment.

Heavy toxic metals

According to a study by Columbia University, “Electronic waste contains toxic heavy metals like lead, mercury, and beryllium, as well as polluting PVC plastic and hazardous chemicals such as brominated flame retardants, which can harm human health and the environment as toxic chemicals can leach from the e-waste and end up contaminating the land, air, and water supplies.”

Extended Producer Responsibility (EPR)

According to the Organization for Economic Co-operation and Development (OECD), EPR is a “policy approach under which producers are given a significant responsibility – financial and/or physical – for the treatment or disposal of post-consumer products. Assigning such responsibility could in principle provide incentives to prevent wastes at the source, promote product design for the environment and support the achievement of public recycling and materials management goals”

Circular Economy

A circular economy aims to keep products and all their materials in circulation at their peak value for as long as possible. In the context of e-waste, this system can be achieved through ways such as urban mining, upcycling, and formal recycling.

Toxic colonialism

Originally coined by Jim Puckett of Greenpeace, toxic colonialism is a general phrase for the export of toxic wastes from a developed country to a weaker or poorer country usually by shipping.

Toxic trade

Despite various hazardous waste trade regulations, some recycling companies participate in toxic colonialism, and export e-waste to developing countries. As a result of this intercontinental stream of e-waste, territories dedicated to agriculture were made into recycling plants, affecting local communities.

Informal Recycling

Also known as backyard operators, workers at informal recycling facilities perform illegal activities and avoid paying taxes as unregistered businesses. In contrast with the formal economy, workers do not have access to protective equipment, good working conditions, and are prone to long-term health hazards.



Figure #1: A backyard operator is seen dismantling a circuit board next to a pile of e-waste without protective equipment in Mumbai, India

Formal Recycling

Formal recycling is a type of e-waste management that is legally registered and adheres to the regulations of the local government to minimize health and environmental hazards during the process. Proper e-waste recycling includes electronics being dismantled, separated, categorized, and cleansed. These items could then be shredded and further sorted for processes such as up-cycling, metal extraction, and other purposes.

Urban Mining

Urban mining is the concept of recycling precious metals extracted from WEEE in an effort to minimize direct mining and help promote a circular economy. By using what is already mined, urban miners can cut costs and reduce greenhouse gas emissions as no mining, processing, or long-range transportation is needed.

Background Information

Challenges to electronic waste management

E-waste is becoming a growing issue globally and is coming under fire recently due to its harmful effects on the environment and human health. A report by the UN E-Waste Coalition predicts that global e-waste production will reach 120 million tonnes per year by 2050 if current trends continue.

Toxic Colonialism

Recycling plants in developed countries face heavy environmental regulations and a growing cost of waste disposal and may find exportation to developing countries more profitable than recycling in their own countries. The illegal cross-border movement of WEEE is also found in the form of donations and charity from rich industrialized countries. In fact, e-waste profiteers can reap considerable profits owing to loose environmental laws, corrupt officials, and poorly paid workers. Consequently, there is a pressing need to establish policies and strategies of managing waste safely in order to achieve an environmentally-sound future.

Impacts on global warming

When e-waste is mismanaged, or incorrectly discarded into landfills, it is typically incinerated along with general waste. This process could discharge air pollutants such as hydrocarbons into the atmosphere. Informal e-waste recyclers that dismantle and melt unwanted parts of WEEE in order to extract valuable metals such as copper also contribute to air pollution. These pollutants would further contribute to the greenhouse gas effects, which scientists believe is a leading cause of global warming.

Impacts on agriculture

Both formal and informal e-waste recycling processes have negative effects on the soil of a region. When e-waste breaks down, it releases toxic heavy metals including lead, mercury, cadmium, arsenic, and polychlorinated biphenyls (PCBs). During this process, toxic juices from both heavy metals and flame retardants are drained directly into the soil, affecting the agriculture that nurtures in the soil nearby or in the area in the future. As a result, these toxins can enter the human food supply which could lead to birth defects and other health complications and reduce the productivity of the farmland. According to Elytus Waste Management Services, large particles released from burning, shredding, or dismantling waste are quickly re-deposited to the ground

due to their size and weight and could remain in the soil for a long period of time harming microorganisms in the soil and plants.

Impacts on the ecosystem

When WEEE is improperly discarded by the residents or technology industries, toxins may accumulate in the groundwater including sources such as ponds, streams, rivers, and lakes that animals and even humans rely on for nourishment. These toxins could lead to the acidification and toxification of the water source, which endangers animal and plant species and cause an unequal balance in the ecosystem, creating detrimental effects for the biodiversity of the regions that are chronically polluted - damages that are often irreversible as chemicals are not biodegradable. Some heavy toxic metals including lead, barium, mercury, and lithium are also carcinogenic and could develop chronic diseases in the human body when in contact for a long period of time. The pollution also has long-term effects for residents living thousands of miles away from recycling centers as clean drinking water is nearly impossible to find.

Impacts on human health

The electronic waste impacts on the environment go hand in hand with human health, and could be addressed in two different sectors: (1) the effects of informal handling of e-waste, and (2) the long-term threat of e-waste management in developing countries.

- (1) The toxic components in WEEE as aforementioned have negative health consequences on humans. The processes of dismantling components, wet chemical processing, and incineration result in direct revelation and inhalation of dangerous chemical substances and has considerable effects on the brain, heart, liver, kidney, skeletal system, as well as the nervous and reproductive systems and could cause neurological disorders. Studies also show an increase in disease and birth defects.
- (2) Combustion from burning WEEE creates small particles, which is linked to pulmonary and cardiovascular disease. Most workers in informal recycling plants do not have access to safety equipment, nor do they know what they are handling. Children are also one of the most vulnerable to the harmful effects especially if they are involved in these processes: community exposures and working accompanying their parents to recycling sites.

Challenges to urban mining

In 2016, the predicted rate of extracted metals in the world's WEEE was \$64.6 billion, but only 20 percent of it was formally recycled for urban mining. A recent study by the UNU revealed that mining copper, gold, and aluminum from ore costs 13 more times more than recovering the metal through urban mining. Many of the EEE including smartphones and other smart devices

require the use of precious metals like rare earth metals or conflict metals that are either hard to obtain due to their short supply, or are extracted in areas of wars and human rights abuses.

Relevant agreements and regulations

Illegal dumps in the ocean and the negative consequences of the global waste trade led to the demand for the establishment of international dumping laws and agreements.

Basel Convention

Formally known as the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, the international agreement aims to ban toxic trade between developed and developing countries and protect human health and the environment from the management of hazardous wastes including e-waste. With 186 countries and the European Union participating in the Convention as of October 2018, it has nearly universal membership. Members of the Convention are obligated to minimize or eliminate waste quantities transported and to treat and dispose of waste as close as possible to their original source. The Convention has also installed regional or sub-regional centers for training and technology transfers regarding e-waste management to cater for the individual needs of said regions. Furthermore, in 2019, parties to the Basel Convention adopted *The Ban Amendment*, which prohibits the export of hazardous waste from members of the European Union, Organization for Economic Cooperation and Development (OECD), and Liechtenstein to all other countries.

UN E-Waste Coalition

In 2017, the UN Environment Management Group (UNEMG) released a report emphasizing the need for strong cooperation among UN organizations to combat the issue on WEEE. As a result, a UN E-Waste Coalition was established. According to the World Health Organization (WHO), the coalition has initiatives including “(1) increasing the evidence and knowledge base; (2) raising awareness and communicating on health impacts, particularly in children; (3) building the capacity of the health sector to better protect children through exposure reduction; (4) promoting monitoring of exposures to e-waste; (5) working with other sectors to implement policies and actions that reduce harmful exposures; (6) advancing specific research about e-waste and related health effects.” In addition, according to the UNEMG, “three core functions of the Coalition are envisaged: advocacy including awareness-raising and campaigns; knowledge and best practice sharing including through the website globalewaste.org; and the development of a joint intervention model for the implementation of e-waste work at the country level.” Key signatories of the Coalition include the UNU, UNEP, WHO, and the Secretariat of the Basel, Rotterdam and Stockholm Conventions.

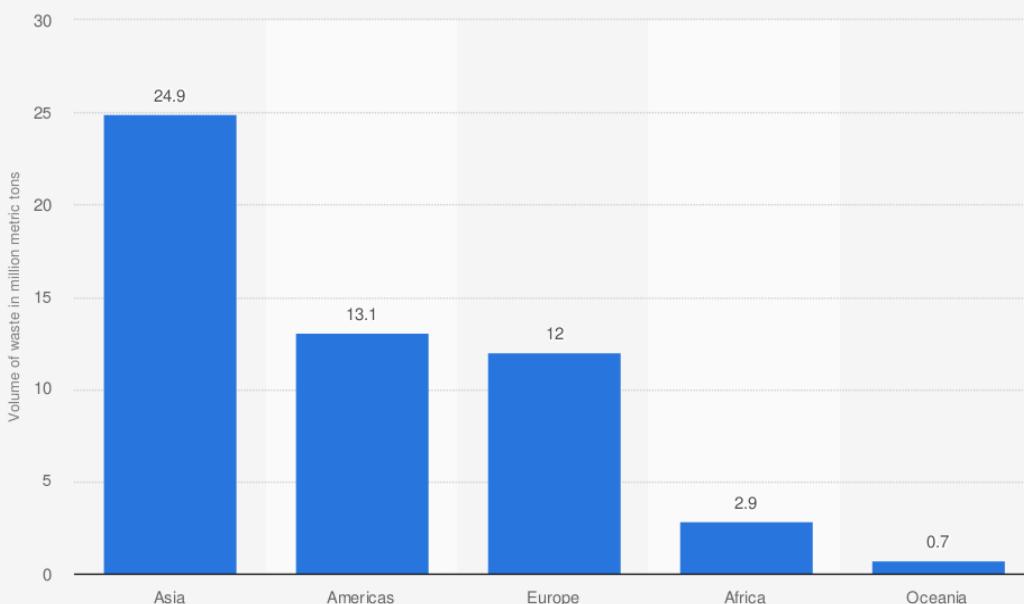
Cartagena Declaration

Formerly known as The Cartagena Declaration on the Prevention, Minimization and Recovery of Hazardous Wastes and Other Wastes, the Declaration further emphasized the need to prevent and minimize toxic waste. The Declaration, signed by members of the Basel Convention, has made it a mission “to [enhance] the active promotion and implementation of more efficient strategies to achieve prevention and minimization of the generation of hazardous wastes and other wastes and their disposal.”

Restriction of Hazardous Substances (RoHS) Directive

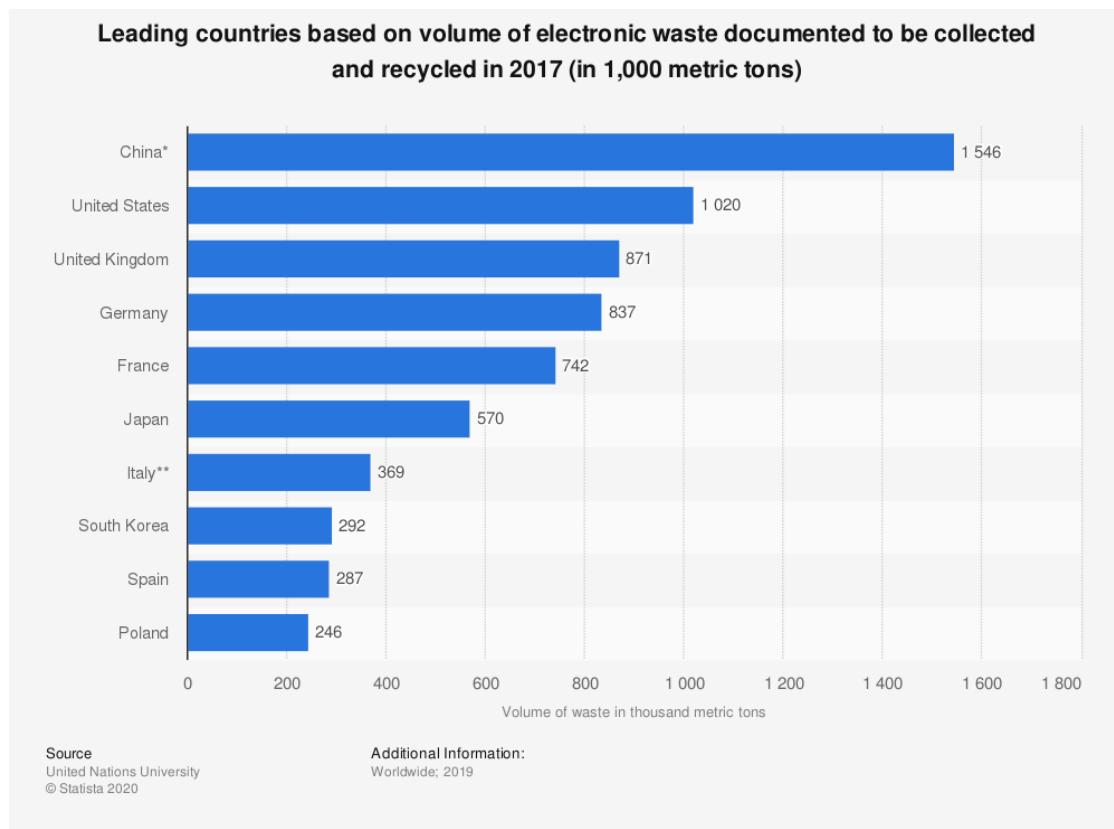
Originating from the European Union, the RoHS Directive (**2002/95/EC**), is a compliance that restrains the use of hazardous substances such as lead, mercury, chromium, and polybrominated biphenyls (PBB) found in EEEs. Businesses that sell or distribute EEE or such components to EU countries must comply with this directive. Moreover, after August 13, 2006, all products transferred in the EU must pass the affiliated WEEE compliance which restricts the number of hazardous chemicals used in EEE manufacturing. Countries outside of the EU have also posed their own versions of the RoHS compliance including the United States, China, Japan, Taiwan, South Korea, Norway, India, Ukraine, Singapore, the UAE, Turkey, Brazil, and the Eurasia/Russia region.

Generation of electronic waste worldwide in 2019, by region (in million metric tons)



Source
United Nations University
© Statista 2020

Additional Information:
Worldwide; 2019

Figure #2: Generation of electronic waste worldwide in 2019, by region (in million metric tons)**Figure #3: Leading countries based on volume of electronic waste documented to be collected and recycled in 2017**

Major Countries and Organizations Involved

China

China faces one of the largest e-waste management challenges among the countries affected by toxic colonialism. While the country is well known for its production and consumption of EEE, especially 70% of the world's e-scrap ends up in Guiyu, a small district in Guangdong Province. The informal recycling hub was formed by stakeholders interested in extracting precious metals from e-waste, and subsequently has caused exceedingly high lead levels in the air, damaging the water and wildlife in the area.

Ghana

Ghana is home to one of the largest WEEE recycling districts in the world: Agbogbloshie. Every day, roughly 5,000 scrap workers sort through electronic waste coming from developed countries in what is known as Africa's largest electronic waste dump. Most of the recycling centers in the district practice informal operations, using crude methods to sort through the electronics - sometimes burning them or

even using acidic chemicals. Toxic substances can be found in the air, water, and soil at concentrations 100 times higher than safe levels. Ghana's current e-waste strategy focuses on replacing backyard operations with formal recycling plants. The Ghanaian government is also showing support for the Agbogbloshie Makerspace Platform (AMP), a project designed to up-cycle old electronics, connecting e-waste sellers to buyers, and providing workers to fix broken appliances. The AMP has created more than 750 working opportunities since 2018 and is working on expanding to international locations in India and Nigeria.



Figure #4: Drone footage of an informal e-waste recycling center and nearby living district in Agbogbloshie, Ghana

Switzerland

Despite being one of the largest WEEE producers - producing 184 kilotons of waste in 2016 - Switzerland has the reputation of being the leading model in e-waste management, with a recycling rate as high as 95 percent in 2018. In fact, Switzerland's first electronic waste recycling system was implemented in 1991 with the method to collect refrigerators. The strong "take-back" system eventually grew for all WEEE, where consumers had access to recycling collection points or electronic shops located around the country. However, Switzerland is also facing challenges in e-waste recycling such as creating a safe working environment, developing a well-rounded management system, and minimizing the need to send complicated waste to developing countries.

United States

In 2017, “Americans spent \$71 billion on telecommunications equipment, nearly five times the amount spent in 2010” according to the U.S. Bureau of Economic Analysis. However, only a quarter of all U.S. WEEE is recycled; the rest is either incinerated or piled up in landfills. Besides that, the U.S. is the largest generator of e-scrap worldwide, and the only developed country not yet ratifying the Basel

Convention. In fact, in 2018, as much as 40 per cent of the e-waste supposedly recycled in the country actually ended up in developing countries.

Basel Action Network (BAN)

The Basel Action Network, named after the UN Basel Convention, is a Non-Profit Organization (NPO) dedicated to documenting, terminating, and raising awareness of the global toxic waste trade in an effort to ensure that policies remain on track to the initial objectives of the Basel Convention. BAN has successfully prevented toxic trade from countries including but not limited to Japan, Taiwan, the U.S., and Canada. The prevention effort is facilitated by the e-Trash Transparency Project launched in 2014, in which BAN utilized small GPS-based tracking devices placed in WEEE to monitor recyclers and develop reports. At the same time, the NPO created e-Stewards, which certifies and recognizes responsible recyclers and businesses. According to BAN, “the e-Stewards Standard ensures high-quality occupational health and safety and environmental protection. It also prohibits coerced or prison labor and the export of toxic materials.”

European Union (EU)

The European Commission on Environment has made several advances in regards to e-waste management. In addition to adopting the RoHS Directive (**2002/95/EC**) and WEEE Directive (**2002/96/EC**) and the Ban Amendment to the Basel Convention as mentioned in the Background, the EU has also developed a new Circular Economy Action Plan based on the European Green Deal, a program for sustainable growth and development in Europe. The Commission first launched an Action Plan in 2015 in an effort to promote a climate-neutral economy where natural resources and ecosystems are more environmentally sustainable. All 54 actions under the plan have already been or are being implemented. Thereafter, in March of 2020, the Second Action Plan was adopted with 35 actions, and a heavier emphasis on toxic waste management, minimizing waste, and sustainable packaging development.

International Environmental Partnership (IEP)

The IEP is a partnership of the Taiwan Environmental Protection Administration (EPAT), the U.S. Environmental Protection Agency (USEPA), and other international partners that are working together to create a globally sustainable WEEE management system. In order to advance this goal, the partnership coordinated the International E-Waste Management Network (IEMN), which aims to recognize experts in the field, provide a platform to encourage collaboration and training, as well as provide technical assistance to help countries address environmental issues. At least 40 countries have participated in one or more of IEP's 150 activities including the International WEEE Management Workshops that have been held previously in Taiwan, the United States, Vietnam, and Thailand.

International Environmental Technology Center (IETC)

The IETC is a branch of the UNEP and works with the production and distribution of environmentally sustainable technologies with an emphasis on waste management. IETC is an active member of the IEMN, providing management and training courses both within the network, and in in-country advisory services. The Center's "E-waste Academy" projects aim to strengthen the e-waste processes and develop policies to advance sustainable performance within the country. The Center intends to expand its services to more countries in the future in an effort to combat waste-related effects such as the impact on climate change, increased employment, and improve well-being.

Solving the E-Waste Problem (StEP)

Previously an initiative under the United Nations University (UNU), the UNEP, and the UN Conference on Trade and Development (UNCTAD), StEP is a platform combating the global e-waste problem. StEP makes it easier for countries and organizations to address their e-waste issues by providing scientific research and assistance. The initiative along with Hewlett-Packard (HP) are helping countries "work through the many legal, scientific and practical issues involved in managing e-waste, treatment standards, and innovative design to maximize re-use and recycling" according to a media record by the UNU ([MR/E04/07](#)). StEP is currently serving more than 35 members ranging from businesses, international organizations, government agencies, Non-Governmental Organizations (NGOs), and academic institutions internationally.

WEEE Forum

The WEEE Forum is a not-for-profit European association of 40 WEEE producer responsibility organizations from 25 countries. Founded in 2002, the producer responsibility organizations in the Forum have "collected, de-polluted, and recycled or sent for preparation for reuse 21 million tonnes of WEEE" according to the official site. The Forum has acquired fundings from the EU for its ongoing projects including operations in favor of urban mining, circular economy, and secondary raw material extraction. Additionally, the WEEE Forum developed the annual International E-Waste Day in 2018 created with the purpose of raising awareness and encouraging e-waste recycling through a wide range of activities such as temporary city-wide e-waste drop-offs, online campaigns, and conferences open to the public.

Timeline of Events

| Date | Description of event |
|------------------|---|
| May 5, 1992 | The Basel Convention is adopted and ratified by 53 countries |
| August 13, 2004 | The first version of the RoHS Directive is implemented by the EU |
| March 2007 | The StEP initiative is officially launched by the United Nations University |
| April 14, 2014 | The International Environmental Partnership (IEP) is launched in Taipei, Taiwan |
| December 2, 2015 | The Parties of the Basel Convention adopted the Cartagena Declaration |
| October 13, 2018 | The first annual International E-waste Day is launched by the WEEE forum |
| March 4, 2019 | The European Commission adopted the First Circular Economy Action Plan |
| December 5, 2019 | The Basel Ban Amendment became international law |
| March 11, 2020 | The European Commission adopted the Second Circular Economy Action Plan |
| October 14, 2021 | The 2021 iteration of the International E-waste Day will be observed |

Relevant UN Resolutions and Treaties

- Basel Convention: Compilation of decisions on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 2012 (**UNEP/SBC/2012/3**)
- Prohibition of the dumping of radioactive wastes: resolution / adopted by the General Assembly, 12 December 2019 (**A/RES/74/58**)
- The Global E-Waste Monitor 2020: Quantities, Flows, and the Circular Economy Potential, 2020 (**ISBN Digital: 978-92-808-9114-0**)
- United Nations Environment Programme: report of the Governing Council/Global Ministerial Environment Forum on the work of its 26th session, February 2011 (**A/66/25**)
- The Cartagena Declaration on the Prevention, Minimization, and Recovery of Hazardous Wastes and Other Wastes, 30 May 2016 (**OEWG-10/3**)

Possible Solutions

First, the house should focus on strengthening and establishing new international dumping laws. So far, the Basel Convention is the only international treaty that regulates electronic waste and toxic colonialism. However, several countries in the EU have been accused of sending e-waste to developing countries through donations and charity, creating a toxic waste loophole. In 1976, the U.S. passed the Resource Conservation and Recovery Act (RCRA) aimed at protecting the health of humans and the environment from the risks of toxic disposal, reduce the amount of waste produced, and create an environmentally friendly e-waste management system. In order for domestic management to be fully effective, all countries should develop and strengthen their own e-waste laws and form a wider intercontinental consensus.

Install universal Extended Producer Responsibility (EPR) Laws for all EEE-related businesses and corporations. EPR laws are a set of regulations that manufacturers must establish in order to fund systems or collect and recycle obsolete products. Many electronic companies have already adopted this policy, including Apple's trade-in program, which allows customers to recycle electronic devices for free or in some cases, receive a credit towards the next Apple purchase. Member nations should also consider setting up collaborations between their respective governments and large businesses to provide convenient recycling. For instance, EcoATM, a startup based in the U.S., aims to provide easy and secure e-waste recycling through kiosks installed throughout public spaces in the country. Similar plans have also been launched in China through the smartphone app *Baidu Recycle*, a joint project between Chinese internet company Baidu and the UNDP.

Promote a more sustainable approach to electronic production and e-waste management. Member nations are encouraged to advance urban mining and up-cycling processes within their respective countries. Not only would urban mining help decrease the amount of e-waste being produced, it would also generate more working opportunities that are otherwise more safe and legal compared to the informal economy. In addition to recycling, member nations are also encouraged to explore the notion of "Right 2 Repair," a movement that advocates for consumers to be able to repair and reuse their electronics without being subjected to copyright infringement. Electronic manufacturers have been known to decrease the speed of, or limit the use of a product over time in order to encourage re-purchases. However, governments can provide legislation to allow Right 2 Repair. The ability to fix one's devices even with an unauthorized repairer will not only reduce the amount of e-scrap being produced, but also allow e-waste recycling centers to create better systems to manage waste.

Bibliography

"3 Effects of E-Waste on the Environment and Human Health." Green Ewaste Recycling Center, Electronics Recycling Service Inc., 5 Oct. 2018, www.gerecycle.com/3-scary-effects-of-e-waste-on-the-environment-and-human-health/.

"About IEMN." IEMN, 2017, iemn.net/about-iemn/.

"As e-Waste Mountains Soar, UN Urges Smart Technologies to Protect Health || UN News." United Nations News, United Nations, Oct. 2010, news.un.org/en/story/2010/02/330172-e-waste-mountains-soar-un-urges-smart-technologies-protect-health.

"Basel Convention ... Sustainable Development Knowledge Platform." United Nations, United Nations,

sustainabledevelopment.un.org/index.php?page=view&type=30022&nr=1860&menu=3170.

"The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal." UNEP, United Nations Publishing Service, July 2011, wedocs.unep.org/bitstream/handle/20.500.11822/8385/-Basel%20Convention%20on%20the%20Control%20of%20Transboundary%20Movements%20of%20Hazardous%20Wastes%20-20113644.pdf.

Cho, Renee. State of the Planet, 2018, What Can We Do About the Growing E-Waste Problem?, blogs.ei.columbia.edu/2018/08/27/growing-e-waste-problem/.

"Drone Footage Of The E-Waste Mega Dump of Agbogbloshie, Accra - Ghana." For 91 Days Travel, 15 Sept. 2019, www.youtu.be/BdPGO6sfC3c.

"e-Trash Transparency Project." Basel Action Network, www.ban.org/trash-transparency.

"E-Waste on Children's Health." WHO, 2021, www.who.int/teams/environment-climate-change-and-health/settings-populations/children/e-waste.

"Electronics Stewardship." Basel Action Network, www.ban.org/e-stewardship.

"EU Circular Economy Action Plan." European Commission, ec.europa.eu/environment/circular-economy/.

"Extended Producer Responsibility." OECD, www.oecd.org/env/tools-evaluation/extendedproducerresponsibility.htm.

Taipei American School Model United Nations, Taipei 2021 | XVII Annual Session
“First Circular Economy Action Plan.” European Commission,
ec.europa.eu/environment/circular-economy/first_circular_economy_action_plan.html.

Gill, Gitanjali Nain. “Electronic Waste.” Encyclopædia Britannica, Encyclopædia Britannica, Inc., 26 May 2016, www.britannica.com/technology/electronic-waste.

“History of Electronic Waste Recycling Industry.” Stream Recycling, 25 Feb. 2020, www.streamrecycling.com/history-of-electronic-waste-recycling-industry/.

“How Switzerland Is Winning the Battle against e-Waste.” ITU News, 21 Oct. 2019, news.itu.int/how-switzerland-is-winning-the-battle-against-e-waste/.

“IETC's Work on Waste Electrical and Electronic Equipment.” International Technology for Environment, UNEP, www.unenvironment.org/ietc/what-we-do/e-waste-management.

“Informal Sector.” Recyhub Tools for E-waste Recyclers, 2014, www.recyhub.com/informal-sector/.

“Inter-Agency Group on Tackling E-Waste.” UN Environment Management Group, unemg.org/our-work/emerging-issues/innter-agency-issue-management-group-on-tackling-e-waste/.

“International E-Waste Day.” WEEE Forum, 21 July 2020, weee-forum.org/iewd-about/.

“International E-Waste Management Network: PROGRAMS.” IEP, 2017, www.iep-global.org/programs/international-e-waste-management-network/.

Jäger, Karin. “Urban Mining: Hidden Riches in Our Cities.” DW.COM, 3 Dec. 2018, www.dw.com/en/urban-mining-hidden-riches-in-our-cities/a-42913985.

Li, Weila, and Varenyam Achal. “Environmental and Health Impacts Due to e-Waste Disposal in China – A Review.” Science of The Total Environment, Elsevier, 29 May 2020, www.sciencedirect.com/science/article/abs/pii/S0048969720332654.

MCALLISTER, LUCY. “The Human and Environmental Effects of E-Waste.” Population Reference Bureau, 4 Apr. 2AD, www.prb.org/e-waste/.

“Overview: Toxic Colonialism.” Oxford Reference, www.oxfordreference.com/view/10.1093/oi/authority.20110803105117681.

“Remarks by EPA Principal Deputy Assistant Administrator Jane Nishida at Yushan Forum.” American Institute in Taiwan, 15 Nov. 2018, www.ait.org.tw/remarks-by-epa-principal-deputy-assistant-administrator-jane-nishida/.

"RoHS Compliance FAQ." RoHS Guide, www.rohsguide.com/rohs-faq.htm.

"RoHS Initiatives Worldwide." RoHS Guide, www.rohsguide.com/rohs-future.htm.

Semuels, Alana. "Electronic Waste Is Becoming a Global Environmental Problem." Time, TIME USA, LLC., 23 May 2019, time.com/5594380/world-electronic-waste-problem/.

"StEP Initiative: About Us, Organisation." StEP Initiative, 2019, www.step-initiative.org/organisation-rev.html.

"Thematic Review of the United Nations High Level Political Forum ." July 2019, sustainabledevelopment.un.org/content/documents/21789Thematic_review_of_the_UN_HLP_Basel_Convention_14.03.19.pdf.

Tiseo, Ian. "Global e-Waste Generation by Region 2019." Statista, United Nations University, 18 Aug. 2020, www-statista-com.eu1.proxy.openathens.net/statistics/499921/ewaste-generation-worldwide-by-region/.

"UN Report: Time to Seize Opportunity, Tackle Challenge of e-Waste." UN Environment Programme, 24 Jan. 2019, www.unenvironment.org/news-and-stories/press-release/un-report-time-seize-opportunity-tackle-challenge-e-waste.

"UN, Industry, Others Partner to Create World Standards For E-Scrap Recycling, Harvest of Valuable Components ." United Nations University, 6 Mar. 2007, archive.unu.edu/media/archives/2007/files/mre11-07.pdf.

"Waste & Its Negative Effects on the Environment." ELYTUS, 2019, elytus.com/blog/e-waste-and-its-negative-effects-on-the-environment.html.

What Is e-Waste?, 2020, www.sustainability.vic.gov.au/Campaigns/eWaste/What-is-ewaste.

"What Is E-Waste?" CalRecycle, Covered Electronic Waste Recycling Program, 23 June 2020, www.calrecycle.ca.gov/electronics/whatisewaste.

"What We Do." Basel Action Network, 2015, www.ban.org/what-we-do.

"What We Do." WEEE Forum, 24 Apr. 2019, weee-forum.org/what-we-do/.