

Tackle the e-waste challenge!  
**International E-Waste Day**  
14<sup>th</sup> October 2021



## International E-Waste Day - 14 October 2021

*Consumer is the key to Circular Economy!*

International E-Waste Day to focus on the role of consumers in improving rates of reuse, refurbishment and recycling. <https://weee-forum.org/iewd-about/>

This year's International E-Waste Day will focus on the crucial part each of us has in making circularity a reality for e-products.

<https://circulareconomy.europa.eu/platform/en/sector/electronics-and-ict>

Circularity <https://youtu.be/-fPahffWl8c>



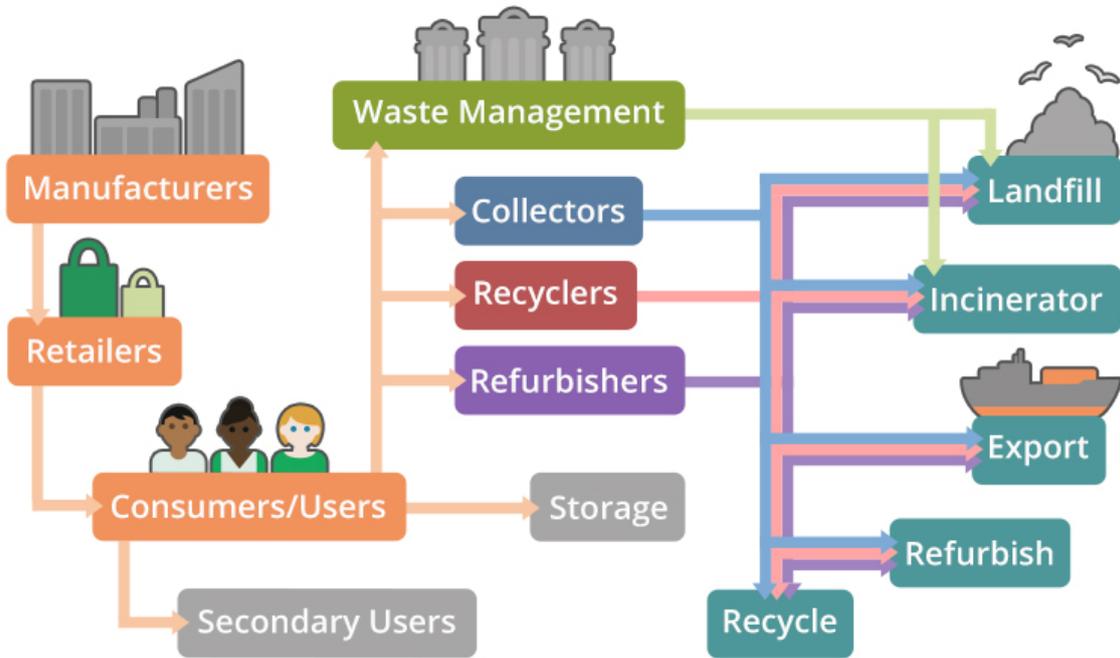
Facts and figures about e-waste for International E-Waste Day 2020

<https://www.youtube.com/watch?v=oMql2XiZVJ0>

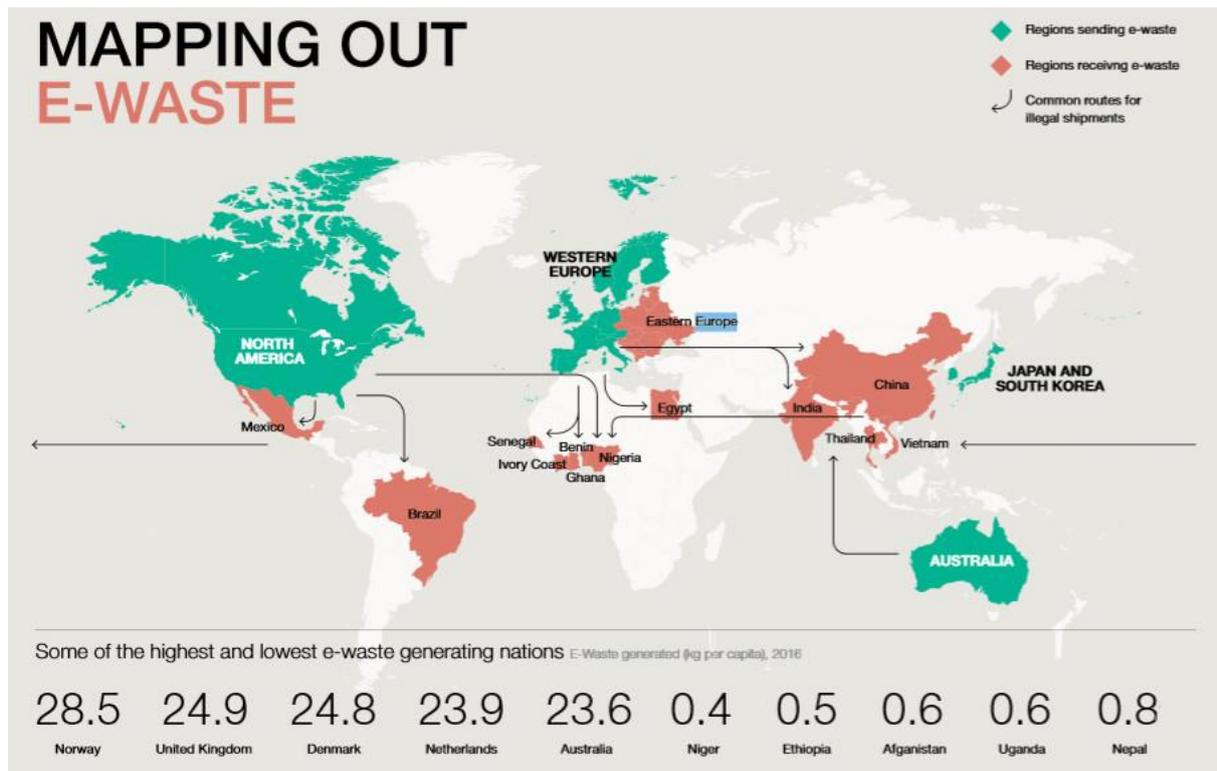
By Santana Luis CEng, CITP, MBCS, MIET

# Lifecycle of Electronics

What happens during post productions



Source: <http://e-stewards.org/learn-more/for-consumers/overview/where-does-your-e-waste-go/>



Source: Lewis 2011, The Global E-waste Statistics Partnership, 2018



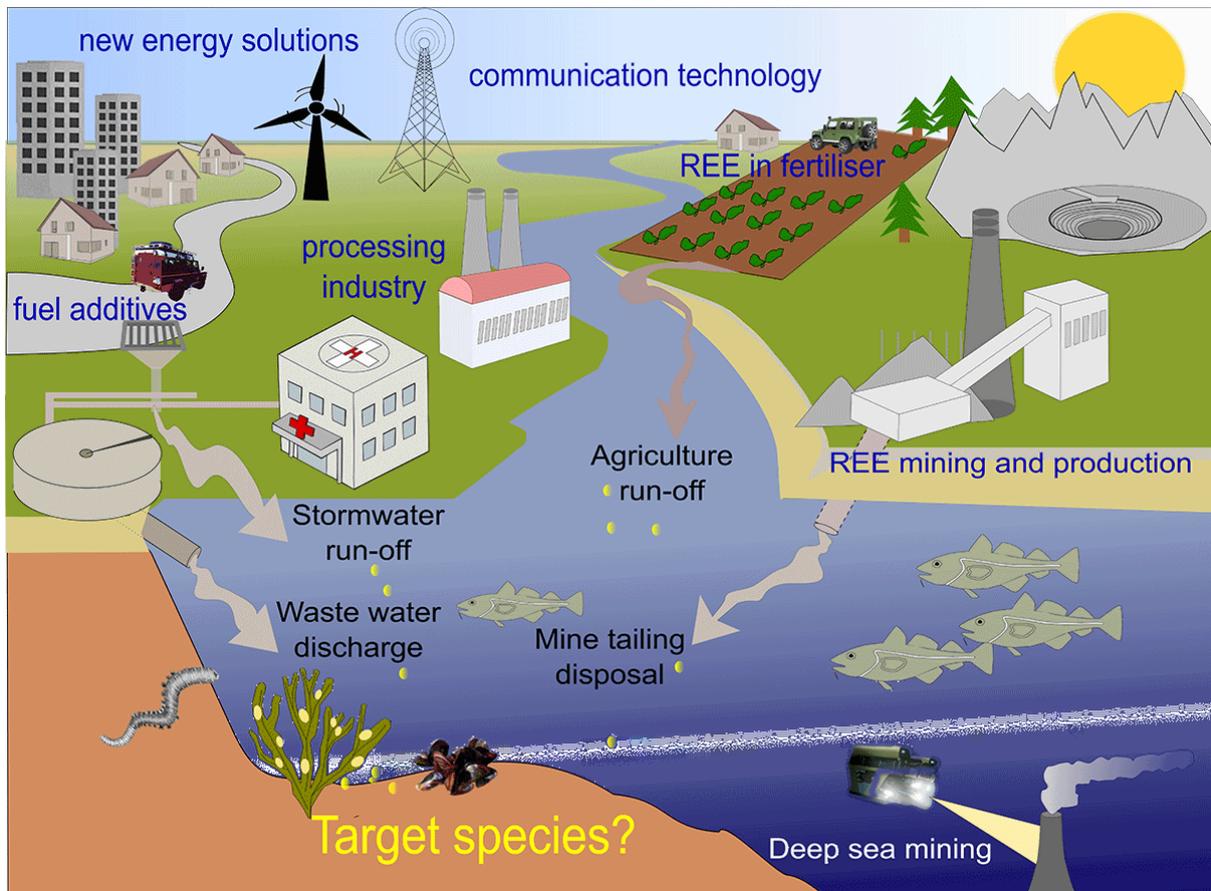
Mount Recyclemore, the giant sculpture of the G7 leaders, sits on a clifftop near Carbis Bay in Cornwall. Photograph: Hugh R Hastings/Getty Images -The Guardian

**A sculpture of the G7 leaders shaped like Mount Rushmore made of electronic waste was erected in Cornwall ahead of the G7 Summit.**



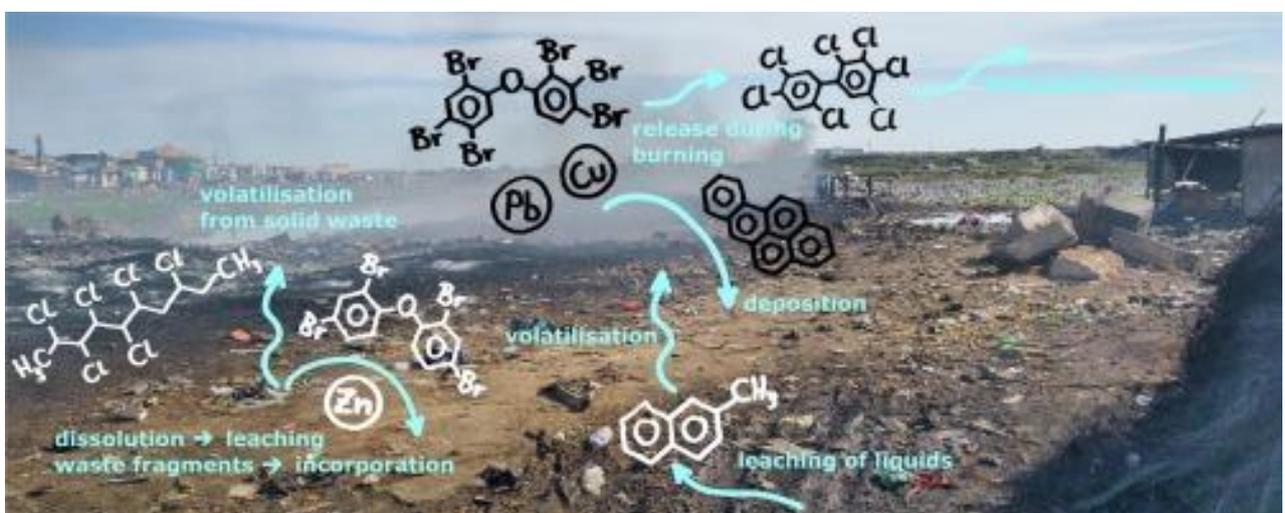
Source: <https://www.ewaste1.com/how-does-recycling-electronics-help-the-environment/>

All REEs are technology critical elements and are used in a wide range of applications including batteries, light source components, fuel additives, fertilizers and medical contrast agents. Rare earth elements are emerging contaminants of concern in the marine environment and their potential effects on marine species.



Source <https://www.sintef.no/en/projects/2020/elementary/>

Possible contamination pathways to the e-waste site



Source: <https://www.sciencedirect.com/science/article/pii/S0160412019340012>

Electronic waste affects nearly every system in the human body because the materials that make up e-waste contain a plethora of toxic components

Among the 18 million children employed illegally in various forms of industry, e-waste and its management is a growing branch. Uncounted numbers of those children are thus at risk of exposure to toxic e-waste through their work in the informal waste sector

### **Hazardous substances present in waste electrical and electronic equipment: sources and routes of human exposure**

<b>Hazardous substance</b>	<b>Component of electrical or electronic equipment (5, 66)</b>	<b>Ecological source of exposure (66)</b>	<b>Main toxic effects in humans (5)</b>
<b>Metals</b>			
Lead (Pb)	Printed circuit boards, cathode ray tubes, light bulbs, televisions, batteries	Air, dust (ashes), water, soil	Neurodevelopmental Renal Cardiovascular Reproductive (66)
Chromium (Cr) or hexavalent chromium	Anticorrosion coatings, data tapes, floppy disks	Air, dust, water, soil	Cancer (Cr VI) Allergy
Cadmium (Cd)	Printer inks, toners, photocopying machines (printer drums), switches, springs, connectors, printed circuit boards, batteries, infrared detectors, semiconductor chips, cathode ray tubes, mobile phones	Air, dust, soil, water, food (especially rice and vegetables)	Renal Bone
Mercury (Hg)	Switches (82), thermostats, sensors, monitors, cells, printed circuit boards, cold cathode fluorescent lamps, LCD screens	Air, vapour, water, soil, food (methylmercury bioaccumulates in fish and shellfish)	Neurodevelopmental Renal
Nickel (Ni)	Batteries, cathode ray tubes	Air, soil, water, food (plants)	Allergy Liver (66)
Lithium (Li)	Batteries	Air, soil, water, food (plants)	Lung damage (66)
Barium (Ba)	Cathode ray tubes, fluorescent lamps	Air, water, soil, food	Neurodegenerative disease (66)
Beryllium (Be)	Power supply boxes, computers, X-ray machines, ceramic components of electronics	Air, food, water	Cancer (66) Lung disease (66)

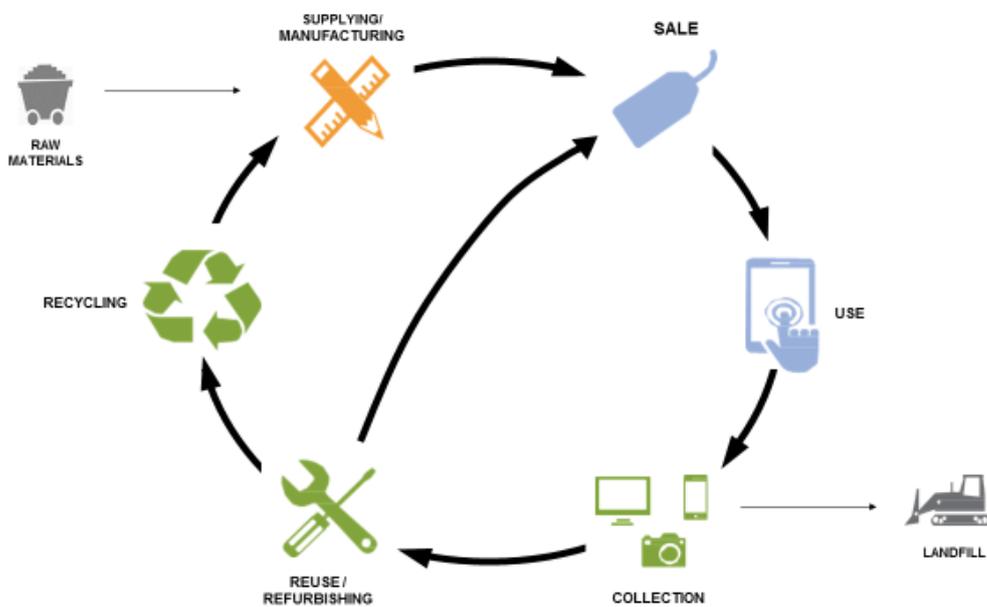
**Source** Children and digital dumpsites: e-waste exposure and child health

<https://www.who.int/publications/i/item/9789240023901>

# How does recycling electronics help the environment? Help prevent air, soil, and water pollution



Source: <https://www.gerecycle.com/tech-waste-recycling/>



Source: <https://www.epa.gov/smm-electronics/basic-information-about-electronics-stewardship>

## Permanent Magnets



## Wind Turbines

Up to 150kg of NdPr per MW



## Electric Vehicles

41 million by 2040 each containing 1.7kg of NdPr



## Electric Bicycles

30 million in 2017 each containing 0.1kg of NdPr



### [Source](#)

Rare earths are the new technology metals, with the light rare earth magnet metals growth driven by hybrid EVs and BEVs.

Appropriate and efficient use of a range of greener products is one important aspect of more sustainable city living. Consider: switching on a compact fluorescent bulb; using certain types of rechargeable, lower toxicity batteries; driving a hybrid car; using electricity generated from wind turbines; using a torch with LEDs.

**Proposal on a common charging solution for electronic devices - reduce e-waste by almost a thousand tonnes annually**

## Commons Environmental Audit Committee

### Electronic Waste and the Circular Economy -

The research and recommendations in this video reflect the work of the MPs on the Environmental Audit Committee <https://www.youtube.com/watch?v=90k2Tk-BUIA>

Electronic Waste and the Circular Economy Report - Increasing the collection of E-waste

### Collection methods

38. Under the UK WEEE regulations there are different methods for the collection of E-waste in the UK which include:

a) Designated Collection Facilities (DCFs) located at Household Waste Recycling Centres (HWRCs) or Civic Amenity (CA) sites operated by Waste Disposal Authorities.

b) Regulation 50 collections set up by Producer Compliance Schemes (PCs) which include kerbside and bulky waste collections operated by Local Authority Waste Collection Authorities and often then taken to HWRCs.

c) Regulation 43 collections which is better known as retailer take-back of E-waste from consumers. This is what is called one-for-one, like-for-like take-back. When somebody buys a new product, retailers offer to take back a similar type of old product for treatment and recycling.[107](#) [108](#) [109](#)

SOURCE: <https://committees.parliament.uk/publications/3675/documents/35777/default/>

## Sustainable Electronics Management

A long-term sustainable approach towards electronics stewardship is necessary both at work and at home. Sustainable electronics management involves the following practices:

Reusing and donating electronics

Preventing waste in the first place is preferable to any waste management option, including recycling. Donating used (but still operating) electronics for reuse extends the lives of valuable products and keeps them out of the waste stream for a longer period.

Recycling electronics

If donation for reuse or repair is not a viable option, households and business can send their used electronics for recycling.

Buying green

Environmentally responsible electronics use involves not only proper end-of-life disposition of obsolete equipment, but also purchasing new equipment that has been designed with environmentally preferable attributes.

Source: <https://www.epa.gov/smm-electronics/basic-information-about-electronics-stewardship>

**Energy waste** is a big concern – so manage your e-waste!

- Dimming the screen slightly,
- Turning off-unused features (like 5G),
- Switching from vibrate to silent or a quiet alarm sound,
- Use the battery-saving mode,
- Turning the screen off, instead of letting it automatically switch off after 5 minutes.

These small changes can help your smartphone battery last longer, thus requiring less charging and saving energy waste.

## General energy efficiency tips

**Computers and laptops** – you'll use less energy by turning it off when it's not in use! Even though powering up your computer takes a higher burst of energy, it's still less than if you left it on while you went to the shops, for example.

**Unplug when it's not being used** – devices will continue to draw power even when they're turned off or the battery is full. So, unplug them at the socket to stop your charges drawing up more electricity.

**Use a sleep mode** – set your devices to go to sleep when they've not been used in 10 minutes. Sleep mode is a much more energy-efficient mode than screen savers!

**Check out power strips** – these are like extension cords, but with a dedicated switch so you can turn off all the plugs at once, or individual plugs. This is an easier way of shutting off the power without unplugging everything at the source.

**Buy a power meter** – these nifty devices measure how much power is being used at any time, so you can see which of your unsustainable electronic devices are sucking up energy when they shouldn't be!

Digitalisation can go a long way to establishing a circular management of e-waste and, thereby, a circular and sustainable economy. Digital solutions such as AI, blockchain or robotics can help to better collect and treat our discarded phones, televisions, and computers, or to prevent them from becoming waste in the first place, by making information easier to share, improving processes and connecting the relevant actors across the value chain.

## Ways to manage your IT products in a circular way

### Exploring today's ethical technology for tomorrow's sustainable possibilities

Investing in environmentally friendly electronics have interdependent benefits.

Look for eco labels (e.g., EPEAT, Energy Star, TCO Certified)

TCO Certified is the world's most comprehensive [sustainability certification for IT products](#), helping you make responsible product choices that drive the industry in a sustainable direction. Using TCO Certified also supports your organization in taking the next step in social and environmental responsibility.

<https://tcocertified.com/product-finder/>

A high Energy Star rated device consumes less energy, reducing your electricity bill significantly. In addition, because less energy is required, it keeps a check on resource (energy) depletion by avoiding over-utilization. It indirectly saves the environment by reducing the load on resources' (energy) extraction and depletion. When purchasing, look for electronics and appliances with the Energy Star logo.

[https://www.energystar.gov/products/office\\_equipment](https://www.energystar.gov/products/office_equipment)

[EPEAT ecolabel https://www.epeat.net/](https://www.epeat.net/)

<https://www.which.co.uk/news/2021/03/what-does-the-new-energy-label-mean-for-you-and-your-home/>

**Proposal on a common charging solution for electronic devices - reduce e-waste by almost a thousand tonnes annually (USB-C <https://www.bbc.co.uk/news/technology-58665809>)**

**Think modular-** Modular electronics have their place in reducing e-waste, though manufacturers have to overcome the hurdles of just how much electronics repair the average consumer can handle on their own.

E.g. [Fairphone](#) does not shy away from the challenge. Look out for climate neutral smartphones. Fairphone will produce a A startup in San Francisco called [Framework](#) is working on a fully modular Windows laptop built with swappable parts, including the CPU.

The **'Right to Repair'** is a growing consumer rights issue and designers can reduce E-waste by making it easy to mend common faults.

Right to repair <https://www.which.co.uk/news/2021/06/new-right-to-repair-laws-introduced-what-do-they-actually-mean-for-you/>

Right to repair project <https://therestartproject.org/>

Online sites such as iFixit provide free, step-by-step guides for fixing common issues across hundreds of different device models, along with pictures of the device and of the required tools for each repair job. <https://www.ifixit.com/Right-to-Repair/E-waste>

**Recycle your electricals** <https://www.recycleyourelectricals.org.uk/>

<https://wrap.org.uk/taking-action/citizen-behaviour-change/recycle-now>

<https://reuse-network.org.uk/>

<https://www.gov.uk/browse/environment-countryside/recycling-waste-management>

<https://www.gov.uk/government/statistical-data-sets/waste-electrical-and-electronic-equipment-weee-in-the-uk>

Material Zoom - The Hidden Elements of Working from Home Amidst COVID

[https://youtu.be/L4yfq\\_wL9fY](https://youtu.be/L4yfq_wL9fY)

**Clean Energy** <https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/executive-summary>

Solving the e-waste problem <https://www.step-initiative.org/>

The Role of Influencing Human Behaviour to Drive a Circular Economy

[https://recyclingpartnership.org/wp-content/uploads/dlm\\_uploads/2021/02/Influencing-Recycling-Behaviors-Whitepaper-Recycling-Partnership.pdf](https://recyclingpartnership.org/wp-content/uploads/dlm_uploads/2021/02/Influencing-Recycling-Behaviors-Whitepaper-Recycling-Partnership.pdf)

**The Sustainable Development Goals (SDGs)**, are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity.

SDGs- <https://www.youtube.com/watch?v=OXTBYMfZyrM>

Better e-waste data will contribute to the achievement of the United Nations' 17 [Sustainable Development Goals](#) (SDGs) in particular SDG12, to 'ensure sustainable consumption and production,' but also other SDGs.

<https://sdg.iisd.org/issues/chemicals-wastes/e-waste/>

Table below maps some of the key hazardous components of e-waste that may contaminate air as aerosols or particulate matter or persist in soil and water and potentially contaminate food supplies.

### SDG targets related to e-waste

The environment is embedded in the integrated SDGs and their targets, a number of which reflect the importance of tackling the devastating impacts of e-waste on children around the world.



#### **SDG 3 – Ensure healthy lives and promote well-being for all at all ages – sets as a target:**

**3.9:** By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.



#### **SDG 8 – Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all – aims to:**

**8.3:** Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services.

**8.7:** Take immediate and effective measures to eradicate forced labour, end modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms.

**8.8:** Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment.



#### **SDG 11 – Make cities inclusive, safe, resilient and sustainable – aims to:**

**11.6:** By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.



#### **SDG 12 – Ensure sustainable consumption and production patterns – Includes:**

**12.4:** By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.

**12.5:** By 2030, substantially reduce waste generation through prevention, reduction, repair, recycling and reuse.

Source: Children and digital dumpsites: e-waste exposure and child health

<https://www.who.int/publications/i/item/9789240023901>

## References:

Tips to save energy <https://energysavingtrust.org.uk/hub/quick-tips-to-save-energy/>

Power management

[https://www.energystar.gov/products/low\\_carbon\\_it\\_campaign/power\\_management\\_computer](https://www.energystar.gov/products/low_carbon_it_campaign/power_management_computer)

A New Circular Vision for Electronics

[https://www3.weforum.org/docs/WEF\\_A\\_New\\_Circular\\_Vision\\_for\\_Electronics.pdf](https://www3.weforum.org/docs/WEF_A_New_Circular_Vision_for_Electronics.pdf)

<https://www.gesi.org/research/gesi-internal-assessment-report-circular-economy>

Extended Product Responsibility (EPR) , Right to Repair & WEEE

<https://committees.parliament.uk/publications/3675/documents/35777/default/>

Restart Project <https://therestartproject.org/>

Defra-industry-guide-ict-sustainability

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/902944/defra-industry-guide-ict-sustainability.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/902944/defra-industry-guide-ict-sustainability.pdf)

Management of waste <https://www.beeco.green/blog/sustainable-electronics/>

Certified USB-PD charger

[https://weee-forum.org/ws\\_news/recycling-critical-metals-in-e-waste/](https://weee-forum.org/ws_news/recycling-critical-metals-in-e-waste/)

<https://weee-forum.org/wp-content/uploads/2021/09/Towards-circular-ewaste-management-how-can-digitalisation-help-EPC.pdf>

Open Repair Alliance is an online platform that collects repair practices to develop repair standards.

<https://openrepair.org/>

Design for the Environment (DfE) [https://en.wikipedia.org/wiki/Design\\_for\\_the\\_Environment](https://en.wikipedia.org/wiki/Design_for_the_Environment)

Design for Circularity Guidelines for the EEE Sector - MDPI

Design for circularity: The Circular Electronics Partnership aims to drive a coordinated transition towards a sustainable and economically viable circular industry. <http://cep2030.org/> &

<http://cep2030.org/files/cep-roadmap.pdf>

Green ICT Standards

<https://globalewaste.org/>

ITU E-Waste reports <https://www.itu.int/en/action/environment-and-climate-change/Pages/latest-reports-and-publications.aspx#ewaste>

The Global E-Waste Monitor 2020 [https://www.itu.int/en/ITU-D/Environment/Documents/Toolbox/GEM\\_2020\\_def.pdf](https://www.itu.int/en/ITU-D/Environment/Documents/Toolbox/GEM_2020_def.pdf)

Behavioural Change for the Circular Economy <https://www.scycle.info/behavioral-change-for-the-circular-economy/> & <https://www.thersa.org/blog/2015/10/blog-behaviour-change-for-ce-part-1>

Closing the loop – the circular economy, what it means and what it can do for you

<https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/Closing-the-loop-the-circular-economy.pdf>