



# E-WASTE (BATTERIES)

**DESCRIPTION:** Batteries are used in many tools and appliances that cannot be plugged into an electrical outlet. Batteries make these items portable and give them a greater range of use. The batteries used in all these devices have similar structures and components that produce electricity.

The main battery types found in UN workplaces include:

- Wet-cell batteries (lead acid batteries) are used in vehicles, boats and many renewable energy systems. They contain lead and sulphuric acid but are highly recyclable.
- The EU<sup>1</sup> defines six kinds of non-recyclable (primary) batteries, used in a range of office and field applications such as watches, remote controls and portable equipment. They include: zinc, alkaline, button alkaline, silver zinc, button zinc, and lithium ion.
- There are eleven<sup>2</sup> types of rechargeable batteries (secondary batteries): nickel-cadmium (NiCD), nickel metal hydride (NiMH), lithium, lithium-ion polymer, alkaline, chargeable titanium, lead SLI, lead traction, lead stationary, nickel-iron, nickel-zinc. Of these, by far the most common is the lithium-ion battery found in most laptops, mobile phones and other similar devices.

**GLOBAL PRODUCTION/DISPOSAL:** 800,000 tonnes of automotive batteries, 190,000 tonnes of industrial batteries, and 160,000 tonnes of consumer batteries enter the European Union yearly.<sup>3</sup> The global battery market is estimated at USD 120 billion per year, with the most significant growth in the secondary, or renewable, battery market.<sup>4</sup>

**COMMON SOURCES:** Vehicles and boats, portable power tools, portable electronic devices (e.g. laptops, phones), watches, flashlights, radios, etc. Increasingly, portable 'power packs' are used to extend the operating time of electronic equipment, and electric and hybrid vehicles and renewable energy power systems are increasingly reliant on energy storage systems to ensure that power generated from the sun/wind is available when users need it. All of these involve some kind of battery technology.

**IMPACTS IF NOT MANAGED CORRECTLY:** Proper disposal of batteries is essential because they contain heavy metals such as mercury, lead, cadmium, and nickel which can endanger human health and the environment if they leach into soil or waterways. Alkaline batteries can leak corrosive fluid once they run flat. Lead, lithium and other metals are in limited supply globally and can be recovered for reuse. The EU directive on batteries bans most forms of batteries containing mercury or cadmium<sup>5</sup>.

**OPTIONS FOR REDUCING:** Switch to rechargeable batteries instead of single-use batteries for every possible application: choose NiMH rather than NiCD as cadmium is a hazardous waste and NiCD batteries hold less capacity for the same sized battery.<sup>6</sup> Each rechargeable battery can replace hundreds of single-use batteries. Choose batteries with the greatest number of 'charging cycles': for a laptop or phone battery, this could be up to 1,000 cycles.

**OPTIONS FOR REUSING:** Extend the life of your batteries as much as possible. Don't leave batteries in a device if you suspect it will not be used for several months. Avoid wasteful 'standby' power consumption: many devices don't power off completely when switched off and will

## DID YOU KNOW?

About 99% of the contents of a lead-acid battery (used for cars and many renewable power systems) can be reclaimed and recycled into new products?

gradually drain power from the batteries. Avoid leaving batteries or battery-powered devices in very warm places: extreme temperatures reduce battery performance and may also lead to leakage.

**OPTIONS FOR RECYCLING:** Most types of batteries can be recycled and many capital cities have battery collection services. However, some batteries are recycled more readily than others, such as lead-acid automotive batteries (nearly 90% are recycled), lithium-ion and button cells (because of the value and toxicity of their chemicals).

**OTHER OPTIONS (LAST RESORT):** Battery disposal should be minimized, as it represents a waste of resources. Moreover, improper disposal of batteries (e.g. by dumping into the environment) is illegal in many countries. The EU directive on batteries bans all batteries from being disposed of in a landfill or incinerator.

If batteries cannot be recycled because no facilities are locally available, they should be temporarily stored in labelled, sealed plastic containers or (for lead-acid batteries) under cover in banded areas. Periodically check for leakages of liquids and keep away from heat sources, in a well ventilated and covered area. If there are any acid leaks, these can be neutralised with baking soda, using appropriate personal protective equipment.

Batteries may be given to licensed third parties for recycling in another country, provided they respect all applicable legislation on transboundary movement of hazardous waste (e.g. Basel Convention).

Where no regulations exist or if no hazardous waste collection or sanitary (lined) landfill is available, batteries must be placed in a sealed, non-corrosive container so their chemicals can't leach into the soil when sent to landfill.

**OTHER COMMENTS:** Never dispose of batteries in a fire, they could explode.

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## ENDNOTES

- 1 European Commission: Fact sheet: Key waste streams – batteries, website: <http://ec.europa.eu/eurostat/web/waste/key-waste-streams/batteries>.
- 2 European Commission: Fact sheet: Key waste streams – batteries; *ibid*.
- 3 US EPA, 2008, website: [https://archive.epa.gov/oswer/international/web/html/200806\\_tl-eu-directive-batteries-accumulators.html](https://archive.epa.gov/oswer/international/web/html/200806_tl-eu-directive-batteries-accumulators.html).
- 4 Cadex Electronics, 2017, website: [http://batteryuniversity.com/learn/article/global\\_battery\\_markets](http://batteryuniversity.com/learn/article/global_battery_markets).
- 5 US EPA, *ibid*.
- 6 Green Batteries, website: <http://www.greenbatteries.com/nimh-battery-faq/>.



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