

How are batteries recycled?



WHY RECYCLE?

Batteries can contain toxic heavy metals, such as nickel, cadmium or mercury. Recycling batteries is good for the environment as it keeps them out of landfill, where heavy metals may leak into the ground when the battery casing corrodes, causing soil and water pollution and endangering wildlife. If batteries are incinerated with household waste, the heavy metals inside them can cause air pollution.

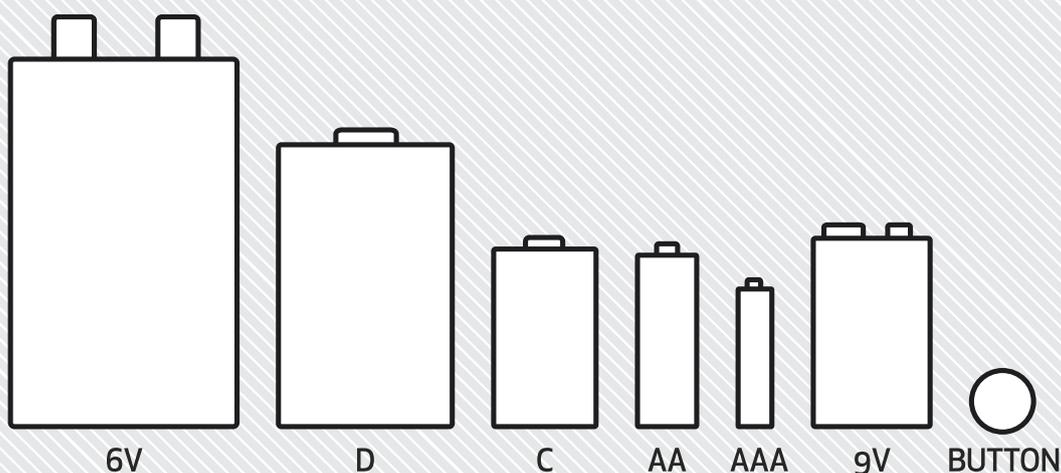
Recycling batteries recovers these valuable metals and saves energy by reducing the need for raw materials.

BATTERY RECYCLING LEGISLATION

In 2009, the UK adopted the EU's Batteries Directive through the Waste Batteries and Accumulators Regulations. The EU Directive sets a recycling target of 25% of all batteries sold by 2012 and 45% by 2016.

The EU Directive compels battery producers to pay for the collection and treatment of waste batteries. Producers must use a battery compliance scheme to manage recycling on their behalf.

European Recycling Platform (ERP) is one of the UK's leading waste electrical and electronic equipment (WEEE) and batteries recycling schemes. ERP members include Electrolux, Hewlett Packard, Microsoft, Procter & Gamble, Samsung and Sony.



All types of battery can be recycled

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There are three main types of battery:

DISPOSABLE DRY-CELL BATTERIES

Zinc-carbon and zinc-chloride batteries are used in low energy use appliances such as clocks and radios. They are often found in products sold with disposable batteries, as they are cheap.

Alkaline batteries are used in equipment such as MP3 players, torches or toys. They are longer lasting and less prone to leaking than zinc-carbon and zinc-chloride batteries.

Button cell batteries contain mercury, silver, lithium or other valuable heavy metals. Mercuric oxide button cells are used for hearing aids, pacemakers and photographic equipment.

Zinc-air batteries are an alternative to mercuric oxide button cells. They may be used in hearing aids and radio pagers.

Silver oxide button cells are a type of alkaline battery used in electronic watches and calculators.

Lithium button cells are also used in watches and in photographic equipment.

RECYCLING DISPOSABLE BATTERIES

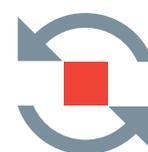
First the batteries are sorted into their different chemistries:

Zinc-carbon and alkaline manganese batteries are treated by hydrometallurgical and pyrometallurgical processes to recover the zinc, steel and ferromanganese.

Button cell batteries can be recycled to recover the mercury, zinc, steel and silver in silver oxide button cells.



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RECHARGEABLE DRY-CELL BATTERIES

Rechargeable battery technology is developing rapidly and its use is increasing in consumer electronics. These batteries have a long life, but need to be disposed of eventually.

Nickel cadmium (NiCd) batteries are used for cordless power tools, medical equipment, alarm systems and emergency lighting. The EU has banned NiCd batteries for other applications, as cadmium is hazardous to human health and effective alternatives exist for all other uses.

Nickel-metal hydride (NiMH) batteries were developed as a less environmentally harmful alternative to NiCd batteries and tend to have a longer life.

Lithium-ion and lithium ion polymer (Li-Ion) batteries have a greater energy storage capacity than NiCd and NiMH batteries. They are found in cameras, MP3 players, laptops, sat navs and mobile phones. There is a risk they can start fires so they must be transported carefully.

RECYCLING RECHARGEABLE BATTERIES

When rechargeable batteries reach the end of their life, they can be recycled:

NiMH batteries are reprocessed by mechanically separating the individual materials (plastic, hydrogen and nickel) within a vacuum chamber to prevent hydrogen escaping. The output is a product with high nickel content which can be used to manufacture stainless steel. Other metals, including iron, are also recovered.

NiCd batteries are treated by a pyrometallurgical process. The cadmium extracted is extremely pure (99.9%) and can be reused in new batteries. Iron-nickel can also be recovered for steel production.

Li-Ion batteries are reprocessed through pyrolysis (heat treatment), which focuses on maximising the recovery of cobalt and other metals such as iron and copper from the battery for resale. The remaining products can then be used in smelting works, cement factories and also as road building materials.



WET-CELL BATTERIES

Used to power vehicles, including cars, and in industry for standby power, lead-acid is the most common type of wet-cell battery.

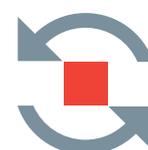
RECYCLING WET-CELL BATTERIES

Lead-acid battery recycling is well established in the UK. The current recycling rate is around 90%.

Different materials, such as lead, plastics and acid, are separated prior to processing or the batteries are processed whole through heat treatment in a furnace. The lead in lead-acid batteries is recovered for reuse in new batteries.



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WHAT IS RECOVERED?



Ferromanganese concentrate

Ferromanganese concentrate recovered from batteries is of a high quality and can be reused by steel producers. One tonne of this concentrate substitutes at least 3 tonnes of iron ore containing manganese, saving the energy which would have been required for iron ore extraction and treatment.



Zinc concentrate

Containing at least 40% zinc, **zinc concentrate** recovered from batteries is reused by zinc smelters and for electrolysis in industry.



Mercury

Pure mercury recovered from batteries can be re-used in metric instruments and fluorescent lighting.



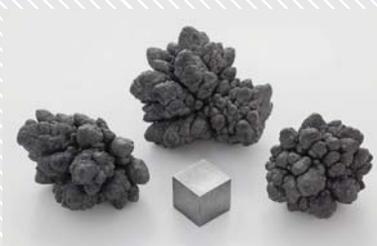
Silver

Jewellers can reuse the **silver** in silver oxide button cells.



Nickel

The **nickel** recovered from batteries can be used to manufacture stainless steel.



Lead

The **lead** recovered from batteries can be re-used in new batteries.



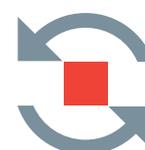
Cadmium

The **cadmium** recovered from batteries can be re-used in new batteries.

FOR MORE INFORMATION

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