WHAT HAPPENS WHEN BATTERIES ARE RECYCLED?

There are many different chemistries of battery, and because they each are made from different chemicals, and work in different ways, each main battery type has a different recycling route.

The main families of batteries are:-

- Lead Acid
- Zinc-based, including Alkaline Manganese, Zinc Carbon, Zinc Air
- Nickel Cadmium
- Nickel Metal Hydride
- Lithium Ion (Rechargeable lithium)
- Lithium Primary (Single use lithium – including Lithium Thionyl Chloride, Lithium Sulphur Dioxide etc.)
- Silver Oxide (most commonly button cells)
- Mercuric Oxide (most commonly button cells)

There are others, but the list above covers the vast majority of batteries in common usage today. There are also several variations of a chemistry, where the recycling route will be the same for all minor variations on the main chemical basis of the battery (e.g. there are some 8 different types of single use (primary) lithium battery).

When batteries within a particular group are recycled, there may be a variety of methods that could be used to recover the useful materials they contain. So even if the recycling method changes, the materials that can be recovered will stay the same.

We will therefore look at each of the main chemical groups in turn, and list the main materials that can be recovered from them in a recycling process.

LEAD ACID BATTERIES

Recovered Material	Potential Uses
Lead	Mainly reused in the manufacture of lead acid batteries
Polypropylene (from the cases of car batteries)	Can be used in a variety of applications, from making new battery cases
Gypsum (from the acid)	Has several uses, in agriculture and other industries

ZINC-BASED, INCLUDING ALKALINE MANGANESE, ZINC CARBON, ZINC AIR

Recovered Material	Potential Uses
Steel (from the battery case)	Steel industry
Zinc	Many Industrial applications
Manganese	Many Industrial applications

Note: Some alkaline batteries still contain a level of mercury, even though this is prohibited by law. It is important that the recycling route used is able to capture any mercury present so that the environment is not polluted by this heavy metal.

NICKEL CADMIUM

Recovered Material	Potential Uses
Nickel	Used in the steel industry
Steel (from the battery case)	Steel industry
Cadmium	Used to make batteries again

NICKEL METAL HYDRIDE

Recovered Material	Potential Uses
Nickel	Used in the steel industry
Steel (from the battery case)	Steel industry

LITHIUM ION (RECHARGEABLE LITHIUM)

Recovered Material	Potential Uses
Cobalt	Applications including electronics and battery manufacture
Steel (from the battery case)	Steel industry

LITHIUM PRIMARY (SINGLE USE LITHIUM – INCLUDING LITHIUM THIONYL CHLORIDE, LITHIUM SULPHUR DIOXIDE ETC.)

Recovered Material	Potential Uses
Steel (from the battery case)	Steel industry

Note: Primary Lithium batteries are very volatile, contain organic electrolyte and are difficult to recycle as they tend not to have any significant metallic content, thus at present it is mainly the metallic case that is recovered

WHAT HAPPENS WHEN BATTERIES ARE RECYCLED?

SILVER OXIDE (MOST COMMONLY BUTTON CELLS)

Recovered Material	Potential Uses
Silver	Used in the photographic and electronics industries
Steel (from the battery case)	Steel industry

MERCURIC OXIDE (MOST COMMONLY BUTTON CELLS)

Recovered Material	Potential Uses
Mercury	Limited industrial applications, including lighting
Steel (from the battery case)	Steel industry