

Fact Sheet

Fast facts about batteries

History

- + The modern battery was invented in 1800 by Alessandro Volta. The unit of measurement for electrical potential, the volt, was named after himⁱ. Volta also discovered methane gasⁱⁱ.
- + Georg Neumann, inventor of the first fully sealed NiCd battery, was also a pioneer in microphone developmentⁱⁱⁱ.
- + French physicist Gaston Planté invented the first rechargeable battery (lead-acid) in 1859^{iv}.
- + Akira Yoshino won the Nobel Prize for Chemistry in 2019 for his work on developing lithium-ion batteries^v.
- + The word 'battery' comes from the old French word batterie. It means 'action of beating' which relates to a group of cannons in battle^{vi}.

Batteries in Australia

- + In 2017-18, 182,000 tonnes of batteries were sold in the Australian market. Around 95% of these were imported^{vii}.
- + Also in 2017-18, an estimated 169,000 tonnes of batteries were disposed of. Of these, 151,000 tonnes (89%) were collected for recycling^{viii}. This number seems high because of the high recycling rate of lead-acid car batteries, which are very heavy compared with regular, loose batteries.
- + The remaining 18,600 tonnes (11%) consisted largely of handheld batteries (<5 kg) with non-lead acid chemistries. These were probably sent to landfill^{ix}.
- + Lead-acid batteries that are heavier than 5kgs (like car batteries) have the highest resource recovery rate. Around 99% were collected for recycling in 2017-18^x.
- + By the 2029-30 financial year, sales of lithium-ion batteries are projected to grow to 279,710 tonnes, from just 26,810 tonnes in 2019-20^{xi}. That's an increase of 943%!

- + Lithium-ion battery sales will be primarily for battery energy storage systems (**BESS**) and electric vehicles (**EV**)^{xii}.



Figure 1. Electronic Vehicle

- + More AA and AAA batteries were sold in Australia in 2017-18 than any other type - over 250,000. The next highest amount sold were button batteries - just under 100,000^{xiii}.
- + Alkaline batteries made up 65% of battery sales by number in 2017-18. By weight, lead acid batteries made up the greatest proportion of sales, at 88%^{xiv}.

Batteries around the world

- + Between 2010 and 2018, global battery demand grew by 30% annually, reaching volumes of 180 GWh in 2018^{xv}.
- + Demand is estimated to keep growing at a rate of 25% annually, to reach a volume of 2,600 GWh in 2030^{xvi}.
- + The main drivers of this growth are the electrification of transportation and the use of batteries in electricity grids^{xvii}.
- + By 2030, passenger cars will account for the largest share (60%) of global battery demand, followed by commercial vehicles at 23%^{xviii}.

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- + Consumer electronics, which accounted for more than 20% of the battery market in 2019, will represent only a marginal share of the global battery market in 2030^{xxix}.
- + The battery industry created approximately \$40B in economic value in 2018, and grew 15% annually over the last decade^{xx}.
- + In 2018, an estimated 2M people were employed in the battery value chain, of which >1.6M were in developing countries^{xxi}.
- + Batteries could enable 30% of the required emission reductions in the transport and power sector. Recovering and reusing the materials in batteries is an important part of achieving the Paris Agreement target of keeping global warming below 2 degrees Celsius^{xxii}.

The risks

- + In Australia, 20 come to hospital emergency departments each week, suspected of having swallowed or inserted a button battery^{xxiii}.
- + When ingested or inserted, the electrical current in a battery can react with bodily fluids like saliva, turning it into a caustic solution that can burn in as little as two hours and cause death^{xxiv}.
- + Electrical short circuits have been known to occur in lithium-ion batteries. This can trigger a 'thermal runaway' - where one exothermal (heat releasing) process triggers another, resulting in an uncontrollable increase in temperature, and in extreme cases, fire^{xxv}.

Recycling vs. landfill

- + When disposed of in landfill, batteries can leak toxic materials into the environment, including lead, mercury, and cadmium^{xxvi}. These can pollute soil and water, leading to adverse effects on the kidneys, skeletal systems and respiratory systems of humans and other animals.

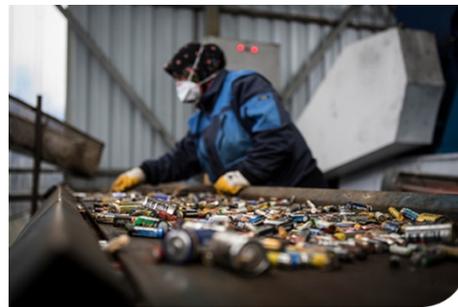


Figure 2. Recycling factory

- + If recycled, up to 95% of a battery's components can be turned into new batteries or used in other industries^{xxvii}.
- + Recovered materials from alkaline and zinc carbon batteries can be recycled into agricultural fertilisers. Recovered steel can be used again in manufacturing^{xxviii}.
- + Before battery recyclers can recycle batteries, they first sort them according to their chemistry^{xxix}.
- + Batteries disposed of in household or workplace bins can cause fires in collection trucks, at material recycling facilities, and in landfills.
- + Batteries are the most common form of hazardous household waste in Australia^{xxx}. In many Australian States and Territories, disposing of them into the garbage stream is against the law.

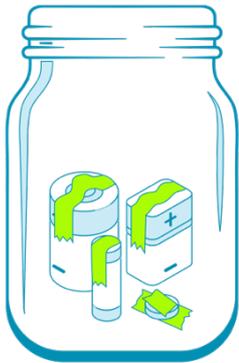
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Batteries and you

The following tips can help you safely use and recycle batteries:

- + **Reduce.** Reduce the number of devices you use that require batteries, or connect devices to mains power where possible.
- + **Recharge.** Where use of batteries is required, try using rechargeable ones. Rechargeable batteries can be recharged up to 1,000 times^{xxxi}.
- + **Recycle.** Used batteries should be taken to an accredited B-cycle Drop off point to be recycled through an accredited B-cycle Recycler. A full list of accredited Drop off points can be found at B-cycle.com.au.
- + **Secure.** Ensure batteries are secured in devices to avoid the risk of ingestion or insertion.



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References

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