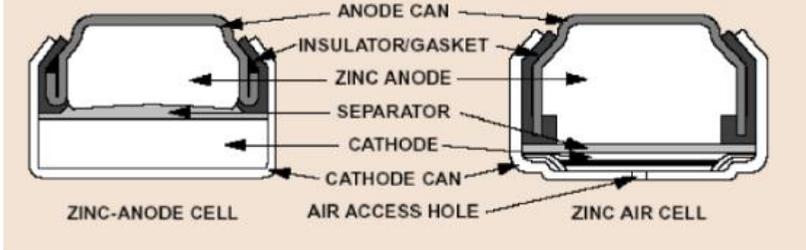


Batteries

Information received from [EU](#), [Canada](#), [Japan](#), [Indonesia](#), [USA](#) and other stakeholders (BAJ, IPEN, NRDC, ZMWG)

<p>1. Category of mercury-added product</p>	<p>Batteries</p>
<p>2. Further description of the product</p>	<p>Mercury-containing button cells</p>
<p>3. Information on the use of the product</p>	<p>Currently, there are three types of button cell batteries that contain mercury: zinc air, silver oxide and alkaline. These batteries contain mercury in small amounts (typically 0.1-2%) and the purpose of mercury in the cell is to prevent the build-up of hydrogen gas. The mercury acts as a barrier to the production of hydrogen and as such prevents the cell swelling and becoming damaged.</p> <p>Figure 1 – Cross Section of Zinc Anode Button Cell and Zinc Air Button Cell (European Commission, 2014)</p>  <p><u>Range of mercury content/consumption per unit product</u></p> <ul style="list-style-type: none"> - 0.1 – 2 weight-% (button cells with intentionally added mercury) - 0.0005 weight-% (button cells without intentionally added mercury) <p>Button batteries are used for powering high drain devices such as watches, calculators, and hearing aids.</p>
<p>4. Information on the availability of mercury-free (or less-mercury) alternatives</p>	<p>EU</p> <p><u>Main alternatives: Mercury-free zinc air batteries</u></p> <p>Mercury free versions are commercially available for all applications of the main types of button cells (lithium, silver, oxide, alkaline and zinc air). The most frequently used types make use of zinc air technology (European Commission, 2014).</p> <p>Since October 2015, mercury-containing button cell batteries have been prohibited in the EU following the expiry of the exemption granted under the Batteries Directive.</p>

Canada

Alternatives: mercury-free silver oxide batteries, mercury-free zinc air batteries, lithium batteries

Mercury-free alternatives have been available from major battery manufacturers since the late 1990s and early 2000s (e.g. Sony, Panasonic, Duracell, Rayovac, Energizer, Maxell). It was reported that representatives of the battery industry agreed that mercury-free alternatives would be widely available in the USA by 2011 and would have comparable prices.¹

Mercury-free alternatives come in the same shape and size as both mercury-containing zinc air and silver oxide batteries.

Japan

BAJ's member companies have already completed the replacement of mercury-added button zinc silver oxide batteries and button zinc air batteries with mercury-free products.

Regarding mercury-free button zinc air batteries, though there used to be a challenge on the risk of rupture and leakage due to the removal of mercury which has a function to prevent the gas generation, hearing-aid manufactures have started to use the mercury-free zinc-air batteries since the technological advancement enabled them to ensure its safety.

Indonesia

Material substitution and technologies for mercury free already available more than 20 years ago. One out of 4 (four) manufacturing dry cell batteries still use mercury content in product. Plan for total mercury free for all dry Battery manufacturing on progress.

IPEN

Mercury-free silver oxide batteries, mercury-free zinc air batteries, lithium batteries are a commonly available alternative for button batteries.

NRDC

Global availability of mercury free zinc air and silver oxide buttons cells has substantially increased. Many manufacturers now provide these battery types mercury free. In the case of zinc air button cells, used primarily for hearing aids, the following global companies offer mercury free products: Sony, Power One, Varta (Montana Tech), Renata, Duracell, Energizer, Rayovac (Spectrum), iCell Technologies, Toshiba, Kodak, Nexcell, and Camelion. Battery manufacturer associations in Japan, Europe, North America and Latin America report all their member companies successfully phased out mercury use.

In China, zinc air button cells are manufactured by Zeni Power (Zhuhai ZhiLi), one of the largest global hearing aid battery manufacturers. Other Chinese companies producing or marketing mercury free hearing aid batteries include Shenzhen Euni Battery Company, Shenzhen Everwin, Guangzhou Great Power Energy & Technology, Naccon Power Technology, NAFU, Guangdong TIANQIU Electronics Technology, Shenzhen Doublepow Electronic Technology, Shenzhen Estar Battery Company, and Fuzhou TDRForce Technology Co. In addition, imported mercury free batteries are available on the Chinese market from providers not otherwise listed above, such as Resound, Soundmend, and SMENGD.

In the case of silver oxide batteries, often used in watches, major global manufacturers/marketers include Renata, Maxell, Sony, Seiko, Varta, Camelion, Energizer, Duracell, and Panasonic. Again, battery manufacturer associations in Japan, Europe, North America, and Latin America report all their member companies successfully phased out this mercury use. Chinese manufacturers include Shenzhen Vtery (Weineng), Dongguan Enchi Electronics, Shenzhen THUMBCELLS, Dongguan Dituo, Shenzhen Anderui, Shenzhen XSYCELL, Huizhou JinYu, Shenzhen Dualwin Technology Company, Ningbo Baisheng Electronic Technology, and Dongguan Liantong Photoelectricity Technology Company.

Battery Associations of Japan, Europe, North America and Latin America

All members of BAJ, EPBA, NEMA and ALPiBa have ceased manufacturing mercury-added button batteries and supply mercury-free alternatives. We believe our products collectively represent 90% of the global market.

Battery Association of Japan (BAJ)

Global availability and situation of mercury-free button cell batteries

- China: In Nov. 2020 China notified WTO/TBT for circulation of the national standard titled “Content Limitation of Mercury, Cadmium and Lead for Zinc Anode Primary Battery”, which limits allowable mercury content in button batteries to 0.0005% (G/TBT/N/CHN/1503)
- India has no button battery manufacturers in its territory, but has easy access to mercury-free alternatives. Silver oxide batteries are mainly imported from China. Zinc air batteries mostly come from EU via Singapore.
- Africa also relies on import. To take an example of South Africa in 2019, it imported 84% of silver oxide batteries from Switzerland, US and Japan, those regarded as mercury free. 91% of zinc air batteries were imported from Germany and UK.

<p>5.(i) Information on the technical feasibility of alternatives</p>	<p>EU In the USA following a ban of mercury-containing button cells, there were initial issues relating to performance and usability of mercury-free alternatives however, these have now been overcome following technological developments. Stakeholders have confirmed that performance parameters such as self-discharge, leak resistance, capacity and pulse capability of mercury-free button cells are comparable to traditional mercury-containing cells (BIO Intelligence, 2012).</p> <p>Canada Panasonic reports that their mercury-free zinc air batteries have up to a 20% increased capacity compared to their previous zinc air batteries. They also note that zinc is much lighter and cheaper than lithium, and that their mercury-free zinc air batteries contain twice as much energy as a lithium-ion battery.² Seiko has also suggested that their mercury-free silver oxide battery has better leakage resistance and discharge characteristics in low temperatures compared to those containing mercury.³</p>
<p>5.(ii) Information on the economic feasibility of alternatives</p>	<p>EU Mercury-free alternatives currently cost approximately 10% more than mercury-containing cells to consumers (BIO Intelligence, 2012). There is a marginal cost to button cell manufacturers for investments in Research and Development (R&D) and assembly line adaptations and these costs are likely to be passed on by retailers to consumers which, is expected to be reflected in an increase in retail price by 5-10%. The Lowell Centre for Sustainable Production in Massachusetts conducted a study in 2011 on the economics of converting to mercury-free products including button cell batteries, and found that maintenance of dual production capability between mercury and non-mercury products creates inefficiencies increasing the cost of production (Lowell Centre for Sustainable Products, 2011). There are economic benefits to waste collectors and recyclers from mercury-free alternatives in the form of a 30-40% lower cost of recycling button cell waste (BIO Intelligence, 2021).</p> <p>Battery Association of Japan (BAJ) Regarding cost comparison, mercury-free button cells used to be more expensive than mercury-added cells due to the initial capital investments for companies to change their production line and business processes. However, with the course of time, the cost has come down since major battery manufacturers have already shifted to mercury-free. If manufacturers had to allocate production lines for mercury-added products from time to time, it would cost more.</p>

<p>6. Information on environmental and health risks and benefits of alternatives</p>	<p>EU In the EU, it was estimated that in 2009, 88% of button cell batteries were not collected for separate waste collection and as such would have been disposed in landfills or incinerated. This represented an estimated 4.5 tonnes of mercury going to disposal. Due to the difficulty in increasing separate waste collection rates of batteries, substitution of mercury with alternatives is the most effective way of reducing this environmental impact.</p> <p>Canada While recycling of batteries is the preferred option, in some jurisdictions, due to the absence of local disposal facilities for all types of waste, some types of mercury-free button cells (i.e. alkaline) are disposed of as household waste. According to the available information, the components of the mercury-free alkaline battery waste are relatively inert and pose little risks to the environment or human; whereas mercury containing batteries are hazardous waste and require special treatment for disposal.^{4,5} Mercury-free zinc air and mercury-free silver oxide batteries can be recycled with other alkaline battery types and would not need special equipment for processing such as a mercury retort oven.⁶</p>
<p>7. If any, additional information being submitted on mercury-added products pursuant to Article 4.4 of the Convention not addressed above (e.g. manufacture, general trade information, etc.)</p>	<p>N/A</p>
<p>8. Other relevant information pursuant to Decision MC-3/1</p>	<p>EU (supplemented by US comments) <u>Examples of regional or national restrictions</u> Mercury has already been eliminated from most batteries (e.g. mercuric oxide batteries) in the EU as a result of restrictions imposed by Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators (Batteries Directive), which prohibits the placing on the market of batteries and accumulators containing more than 0.0005% Hg by weight. This threshold intends to cover trace contamination and reflects current measurement limitations. Mercury-containing batteries are classified as hazardous waste but only a certain proportion are required to be separately collected for further recycling (45% since 2016) by the Directive.</p> <p>In 1996, the USA introduced a national ban on mercury oxide batteries, after which a number of states implemented a ban on all types of mercury containing button cell batteries including Connecticut, Maine, Rhode Island, Louisiana, Wisconsin, and Illinois (Lowell Centre for Sustainable Products, 2011). With respect to mercury</p>

	<p>or mercury compounds used for the domestic manufacture of mercury-added products in the United States, there was 119 lbs. of silver zinc batteries in 2018 and no distribution or export.</p> <p>In 2011, China issued ‘Clean Production Guidelines’ for the battery sector, including recommendations that companies actively promote mercury-free button cells. Mercury content of zinc button cell batteries produced in China has been 0.005 mg per battery (0.25%) since 2013 (Lin et al., 2016). In 2017, the Chinese Ministry of Environmental Protection issued a mercury regulation that states that from 2021 mercury-containing batteries are prohibited, but includes the Minamata exemption for zinc-silver oxide and zinc air batteries containing less than 2% mercury (CIRS-REACH, 2017).</p> <p>ZMWG</p> <ul style="list-style-type: none"> • <u>India</u>: A recent 2019 market study conducted by Toxics Link, in New Delhi (Jungpura and Kalkaji) markets showed that no mercury containing button cell batteries could be found. The interviewed retailers asserted “They no longer sell mercury-added button cell battery; it used to be available before but now most of the shop sells mercury free batteries as the cost of both the batteries is almost the same” (as per retailer from Kalkaji). In these markets mostly Alkaline and Lithium button cell batteries were available. The previous study of Toxics Link1 also reiterated that in India there is no inventory on the use of mercury in button cell batteries in India. What emerged during the discussions with end users in India was that mercury-free button cell batteries are used in key application areas, such as watches, hearing aids, healthcare instruments, children’s toys, etc. The cell batteries are mainly composed of common materials—steel, zinc and manganese – that do not pose a health or environmental risk in normal use or disposal.
<p>9. References</p>	<p>BIO Intelligence. (2012). <i>Study on the potential for reducing mercury pollution from dental amalgam and batteries</i>. Retrieved from http://ec.europa.eu/environment/chemicals/mercury/pdf/mercury_dental_report.pdf</p> <ul style="list-style-type: none"> • CIRS-REACH. (2017). <i>China Enforcing Mercury Convention</i>. Retrieved from http://www.cirs-reach.com/news-and-articles/China-Enforcing-Mercury-Convention.html • European Commission. (2014). <i>Report on the availability of mercury-free button cells for hearing aids, in accordance with Article 4.4 of Directive 2006/66/EC of the European Parliament and of the Council on batteries and accumulators and waste batteries and repealing.../</i>. Retrieved from http://ec.europa.eu/environment/waste/batteries/pdf/COM_2014_632.pdf • European Commission. (2014). <i>Study: Availability of Mercury-free Button Cells for Hearing Aids</i>. Retrieved from https://publications.europa.eu/en/publication-detail/-/publication/16d794d9-1947-48b9-ba5a-4d9d2e3d3c24/language-en

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Information was collected through interviews with Battery Association of Japan (BAJ). Share of BAJ's member companies is about 95% of domestic shipment for both silver oxide batteries and zinc-air batteries.