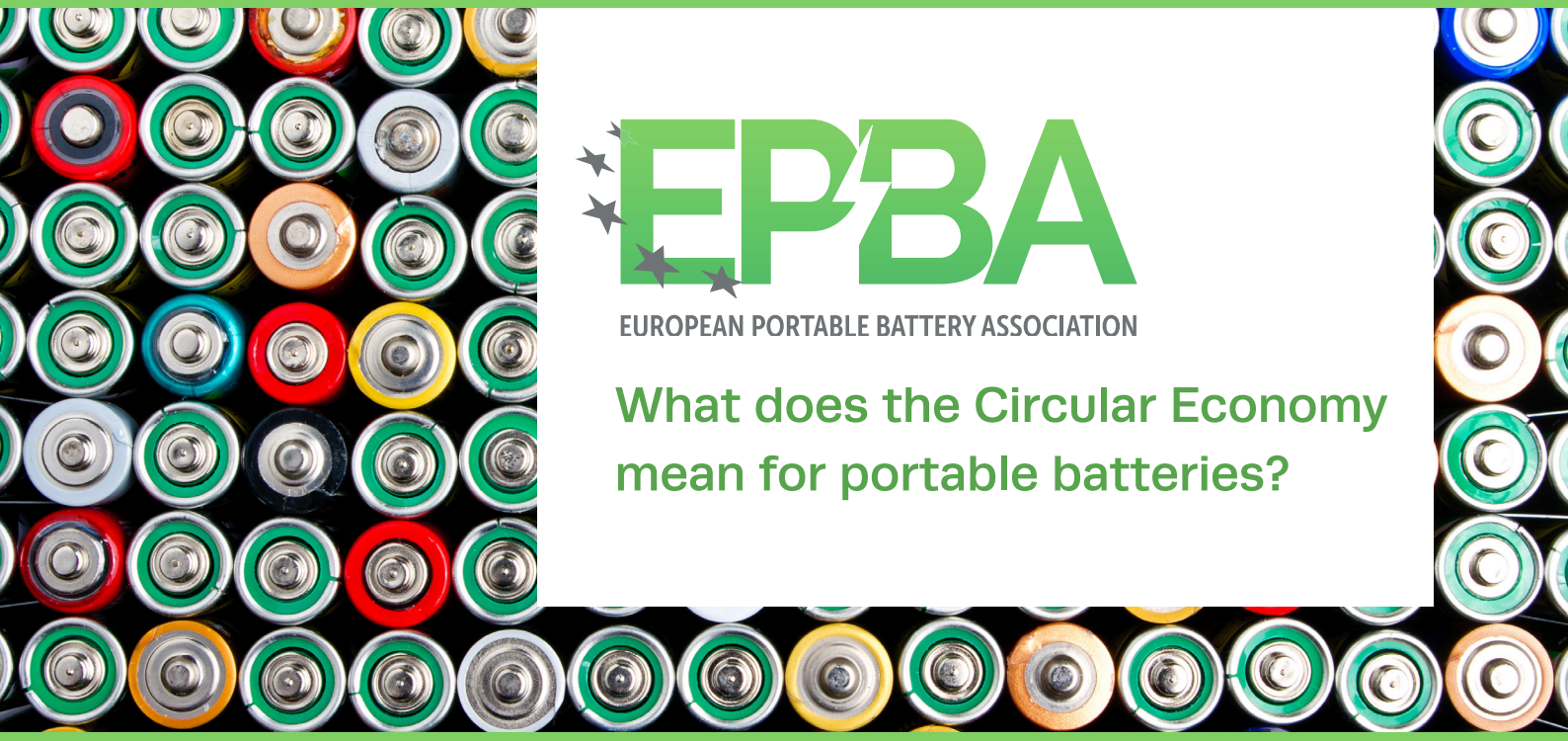
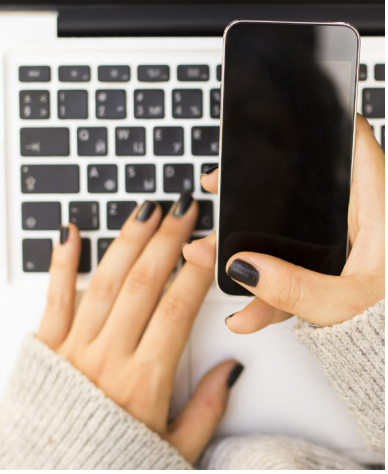


EUROPEAN PORTABLE BATTERY ASSOCIATION

What does the Circular Economy mean for portable batteries?



Introduction

The European Portable Battery Association (EPBA) represents important industry players in the portable battery sector namely Duracell, Energizer, GP Batteries, Panasonic, Varta Consumer, Renata, Sony, Sunlight and Apple. The association supports the common interests of its members regarding portable batteries and battery chargers with European institutions and other leading international bodies.

In its communication "Closing the loop – An EU action plan for the Circular Economy"[1], the European Commission defines the "circular economy" as a set of activities in which "the value of products, materials and resources is maintained in the economy for as long as possible and the generation of waste minimised".

We want to be a part of this policy discussion which is key for the future of the European economy and industrial competitiveness. We emphasize that the concept of circular economy has to be applied differently according to the type of industry concerned, therefore we advocate for a product-specific policy.

Circular economy applied to the portable battery world

EPBA members produce both primary and rechargeable portable batteries. They have already been applying circular economy thinking to their industry for many years.

It is important to understand how five fundamental aspects of the circular economy – reparability, reusability, resource efficiency, recyclability and waste management – apply to the battery sector.

In the case of primary and rechargeable batteries, the repairability and reusability concepts are not applicable for the reasons that we outline here below, however resource efficiency, recyclability and resource management are well integrated in the practice of the battery industry.

[1] http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX%3A52015DC0614&from=EN

1. Repairability

The principle of repairability is core to the circular economy concept, but not all products can be repaired in a way that is both practical and makes economic sense.

Repairing portable batteries is unrealistic because primary and also rechargeable portable cells are typically very small and have to maximize the internal volume available for the chemical reaction partners including the electrical connections to deliver the energy density required by the application.

Unlike a gasoline tank that just requires a refill once it is drained, a drained portable cell would require the complete removal of all exhausted materials inside and afterwards a replacement of all liquids and several solid components.

Once the primary battery is discharged, it cannot be charged back without re-forming the metal in a high temperature environment. Trying to recharge could result in a leakage, rupture or explosion and personal injury, therefore it could pose a real safety risk Also, performance and quality would deteriorate if the initial chemical substances were used again in new batteries.

Even if they can't be repaired, disposable batteries play an important role in many situations especially when charging is impractical or impossible, for example camping, rescue missions, military use, and forest-fire services. In case of a power outage especially in times of disasters personal power solutions from rechargeables are unreliable or non-existent. A flashlight that is required and used for emergencies must work when needed.

In a nutshell, there is an appropriate type of battery according to every type of use, see the EPBA consumer battery selection[2] guide for reference.

2. Reusability

According to Directive 2008/98/EC on Waste and Waste Electrical and Electronic Equipment Directive 2012/19/EU "re-use means any operation by which products or components that are not waste are used again for the same purpose for which they were conceived".

Therefore, if the life of a primary battery can be partially extended by reusing it from a high drain device like a toy in a low drain device like a remote control or clock, this cannot be understood as a form of reuse according to the current legal framework.

For rechargeable batteries, the higher number of charging cycles can indeed be considered as a form or re-use because the charging process should be seen as the required operation to make the depleted battery fit for its original use again. Technically, there are also other operations to extend the number of cycles, for example using smart charging i.e. a charger with discharge function to countermeasure memory effects.

[2] https://www.epbaeurope.net/wp-content/uploads/2016/12/doc-1-consumer-battery-selection- guide.pdf

As far as batteries are concerned, the second life discussion is relevant only for industrial batteries which can be re-used (some components are replaced for the same use) or have a second use (battery is used for another application than its initial purpose) at the end of their first life. It is not the case for portable batteries.

3. Resource efficiency

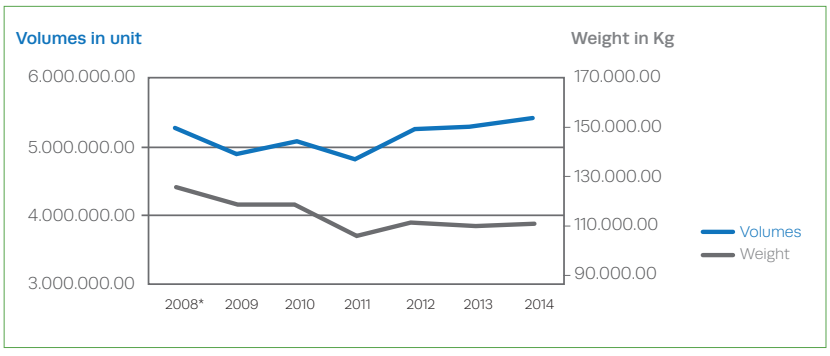
Our members are in continuous search for more efficient use of resources & product design. Resource efficiency means a high level of quality materials for battery production because low quality raw materials mean quicker depletion of batteries and increased waste generation.

For instance, runtime of primary batteries has increased significantly due to more advanced materials (between 27% – 48%) such as special graphite, zinc powder with engineered particle shape and manganese dioxide with improved particle structure.

Also, batteries have become smaller and lighter over the years driven by the miniaturization of devices trend, while being required to deliver more energy to effectively operate devices.

Constant innovation from the battery sector leads equipment manufacturers to design smaller devices meaning less packaging, less cost, less waste at end of life e.g. lithium coin and button cells market are growing as they are being used in more devices.

Title: Decoupling between volumes and weight of portable batteries put on the market
This graph illustrates that there is a strong trend to constantly reduce the weight of portable batteries. Source: EPBA statistical data



Resource efficiency also means more sustainable production processes, which is what some EPBA members are doing by setting CO2 emission reduction goals, reducing water usage, energy utilization, and landfill bound waste for their manufacturing plants.

4. Recyclability

As regulated by the Battery Directive, portable batteries are being collected and recycled throughout the EU.

Secondary raw materials sourced from recycled batteries can be part of other production processes in different industries (electrolysis, stainless steel). However experience from our industry shows that integrating recycled material in the production of new batteries presents a number of challenges still today.

Recycled materials need to enter the process at the stage of generation and refining of the raw materials. In most cases, battery manufacturers have to buy all their relevant raw materials from 3rd party suppliers, very often even from multiple sources for the same material. Battery manufacturers have a hard time imposing such material recycling content requirements on their suppliers. Material suppliers would have to develop/commercialize materials just for final use in batteries.

Also, our members are aware that recyclability has an environmental impact which could therefore result in an ecological footprint that is overall neutral, or even negative.

Indeed, integrating more recycled content can lead to longer material transportation routes, due to the process of buying from the manufacturers of the recycled materials, and therefore higher CO2 emissions.

Recyclability can also go against another circular economy principle, resource efficiency, as it requires a higher quantity of the more active material to obtain the same discharge efficiency.

Finally the focus on recyclability also concerns the cardboard paper of blister packs for which the recycled material content can reach up to 80%.

5. Waste management

EPBA advocates for general minimum requirements for EPR schemes, as adopted in the EP position on the Circular Economy Package. Minimum EPR requirements should focus on transparency of financing, accountability, harmonisation, flexibility, awareness raising, fair competition and enforcement. This would allow for coherent and effective implementation of EU waste management policies at national level.

Conclusions

The members of EPBA will continue their research to enhance the performance of batteries and decrease their environmental footprint. They will support and collaborate with the EU institutions and national administrations on policies which affect the portable power industry.

EPBA members are striving to implement circular economy principles to the design and production of their products as long as it is technically applicable and economically viable. We wish to underline once again that the concepts of repairability and reusability are not applicable to portable batteries: this clearly illustrates that circular economy principles, in order to be relevant, have to be adapted to each industry context and, namely to each type of products.

Main Circular Economy Achievements of Our Industry

We would like to highlight the numerous innovations from our industry which take into account circular economy principles:

- Rechargeable batteries
  - Initial charge is held for a longer time
  - Higher number of charging cycles
- Continuous improvement of energy content of primary batteries:
- Improved longevity of batteries:
  - Increased purity of raw materials
  - Mechanical changes
- Increase in internal volume of batteries
  - Thinner plastic seal and separator papers
  - More efficient separator construction
- Increased shelf life of batteries
  - New additives for protection against corrosion
  - Improved leakage protection
- Decreased battery size over time
  - Appliances require smaller batteries
  - Smaller batteries deliver a higher power output

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