

Annual Report ECOBAT 2019



+ Key results in 2019

46%

Take-back rate

1,696 t

*Take-back of
batteries and
accumulators*

1,102 t

*Metallic raw materials
acquired by recycling
(Ni, Fe, Mn, Cd, Cu,
Zn, Pb, Co, Ag)*

23,212

*Number of collection
points*

1,105

*Number of producers
involved in the ECOBAT
collective system*

The year 2019 was probably the most difficult one in the eighteen-year history of our company. In July, our warehouse of sorted batteries near Prague was hit by a large fire, and overnight we were forced to stop all activities on that site and to stop collecting batteries from a number of other sites until further notice. Unfortunately, facilities of our recycling partners were not spared from fire either, and as a result, revenues in Europe significantly deteriorated, especially as regards lithium batteries. The above-mentioned events have given us a very strong signal to address the issues of fire prevention and safety in handling of lithium batteries with much more attention than previously.

It is almost unbelievable that the final 2019 figures showed the best collection result in the history of our company and that we were also able to achieve balanced economic performance. We are pleased that for most people in the Czech Republic battery sorting and recycling is now absolutely natural, which is reflected in the gradual slight increase in the number of collected batteries and take-back rate.

Our biggest thanks go to our employees. They not only ensured smooth operation of our company and provision of services to our business partners, but they also contributed to the resumption of our activities by physical work and great endeavour.

We would like to thank all our partners who were affected by collection suspension for their patience and trust. In the upcoming years, we want to remain their professional partner in battery collection and recycling.

RNDr. Petr Kratochvíl
Managing Director, ECOBAT s.r.o.



+ The mission and goal

of the not-for-profit organisation ECOBAT is to gradually develop the collective system involving producers and importers of all categories and types of batteries and accumulators. We want to provide affordable services of the highest quality and to be the leader in the battery take-back on the Czech market.

+ Priority No. 1

is currently safety in handling batteries. The maximum possible use of strategic metals (nickel, cobalt, lithium), which are contained in returned batteries, is also extremely important to us. To achieve our goals, we want to make the most of the skills and potential of our own employees.

+ New trends = new challenges

- To fulfil our objectives, we have been actively involved in the development and research of new technical and organisational measures for safe handling of lithium batteries.
- As part of our cooperation with member organisations of the European association EUCOBAT, we are ready to provide a separate take-back solution for producers of electric vehicles and traction lithium batteries across Europe.
- As one of the first organisations in Europe, ECOBAT starts using the principle of eco-modulation in setting user fees, and sets the level of financial responsibility of producers consistently with the impact of individual types of batteries on the environment, public health and safety.



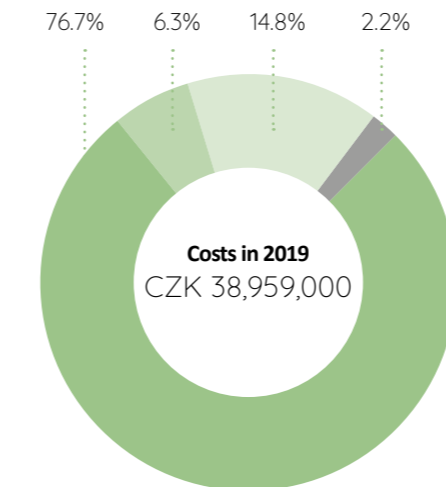
+ Company introduction



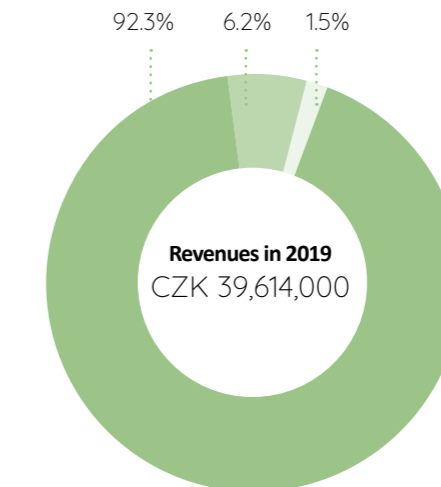
ECOBAT is a not-for-profit organisation providing for the take-back and recycling of waste portable batteries in the Czech Republic since 2002. It was founded by six major battery producers. On 16 December 2009, it was granted an authorisation to operate a collective take-back scheme for portable batteries and accumulators. Through the Czech Association of Portable Battery Producers, ECOBAT has joined the activities of the Czech Circular Economy Association. It is a member of the European Association of National Collection Schemes for Batteries (EUCOBAT), which currently represents 19 major battery take-back systems from 16 European countries.

+ Company financing

In 2019, ECOBAT reported a profit of CZK 655,000, which accounts for 1.7% of its total turnover.
Note: ECOBAT's costs for material recovery of Ni-Cd accumulators reached a record-breaking amount of CZK 1,238,000 in 2019.



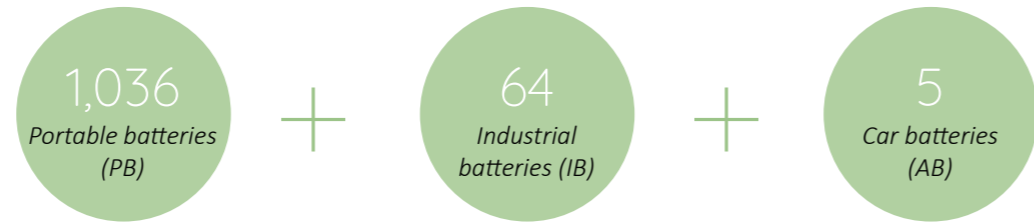
- Collection and recycling
CZK 29,875,000
- Awareness-raising and promotion
CZK 2,472,000
- Administration
CZK 5,775,000
- Miscellaneous
CZK 837,000



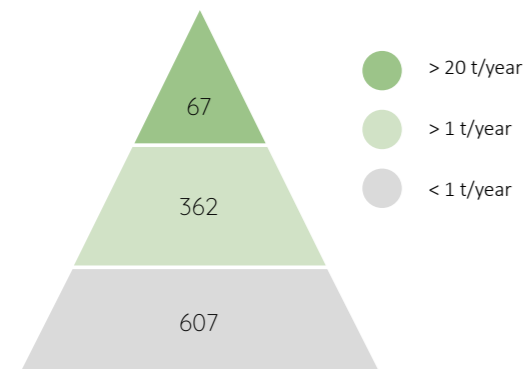
- Fees from producers
CZK 36,558,000
- Sale of secondary raw materials
CZK 2,440,000
- Miscellaneous
CZK 616,000

+ Members

- Bateria Slaný CZ, s. r. o.
- EMOS spol. s r. o. (GP)
- Energizer Czech, spol. s r. o.
- Panasonic Energy Europe N.V.
- Spectrum Brands Czech spol. s r. o. (VARTA)



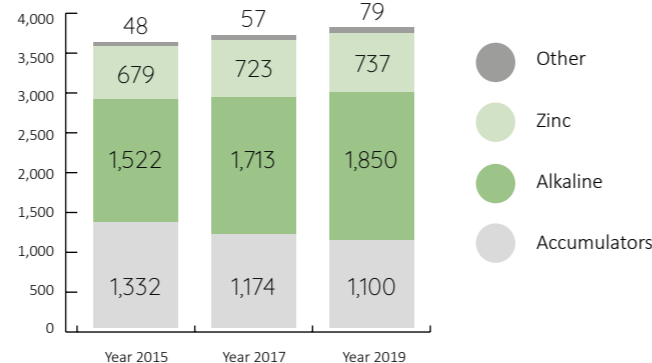
Number of clients broken down by the amount of portable batteries placed on the market



The largest share (59%) of ECOBAT's clients is formed by smaller companies which marketed less than 1 tonne of portable batteries in 2019. Clients which placed more than 20 tonnes are shown at the top of the pyramid; they account for 6% of the portfolio.

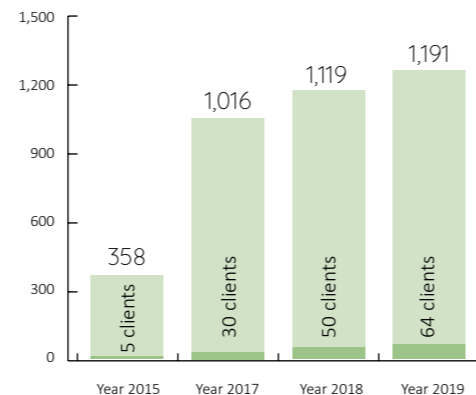
In 2019, each Czech citizen bought on average 11 portable batteries, including 8 disposable primary cells and 3 rechargeable accumulators. Over the past five years, the share of accumulators dropped from 37% in 2015 to 29% in 2019. The opposite trend was expected, i.e. that people would increasingly use accumulators which are more environmentally friendly.

Portable batteries placed on the market (in tonnes)



Over the past three years, approx. 160,000 electric bikes were sold in the Czech Republic. That corresponds to roughly 640 tonnes of lithium accumulators which will need to be safely processed and recycled in the upcoming years.

Industrial batteries placed on the market (in tonnes)



The amount of reported industrial batteries increased almost 3.5 times from 2016 to 2019. The number of industrial battery producers using ECOBAT's services increased 13 times. Use of batteries in e-mobility and new applications is also on the rise. Most newly registered clients were companies selling batteries for bikes, scooters and motor scooters.

+ Growth in the lithium battery segment

Lithium rules the world! With the development of e-mobility, new types of batteries and accumulators are launched on the market. Lithium-ion, lithium-polymer and primary batteries containing metallic lithium have started dominating the market.

Benefits of lithium batteries

- + High energy density
- + Low memory effect
- + Fast charging and low self-discharge
- + Long life (up to 3,000 charging cycles)

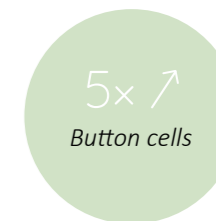
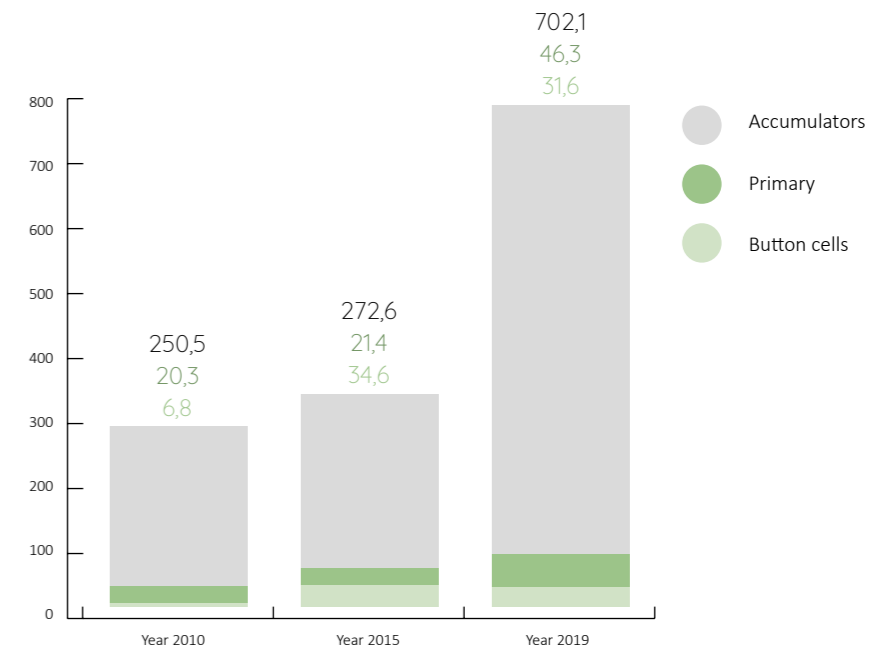
The current methods used to recycle lithium accumulators are five times more expensive than obtaining raw materials for their production by extraction. On the contrary, reuse of lithium cells from batteries designed for electromobility is a favourable trend. Once batteries are disassembled and the individual cells are carefully measured, the cells can be used for instance for assembly of new batteries (e.g. to store energy from solar panels).

Disadvantages of lithium batteries

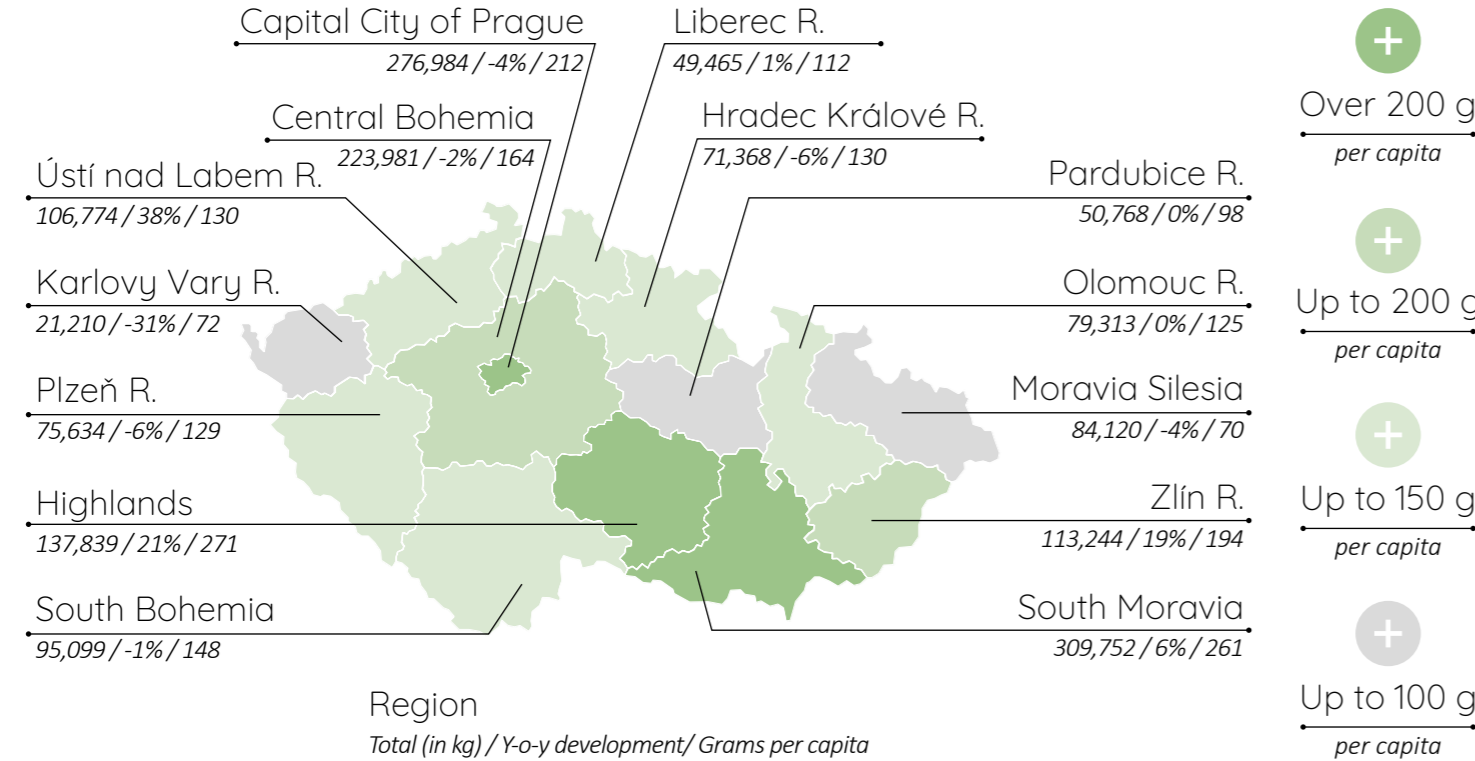
- Higher price
- Content of unstable and flammable chemicals
- High requirements for safe storage and transportation
- Currently insufficient recycling capacity

The most preferred properties of batteries have increasingly been **small dimensions and long life**. An example demonstrating this trend are button cells which are used mainly in watches, calculators, motherboards and other electrical appliances. In this category, too, lithium button cells have been booming. From the environmental point of view, their major disadvantage is that they cannot be recycled and have to be incinerated.

Lithium batteries placed on the market (in tonnes)



+ Take-back per regions in 2019



46%
Take-back rate

What is the take-back rate? It represents the ratio of weight of taken-back batteries to the weight of batteries placed on the market. For the purpose of calculation, the weight of collected batteries is a result per specific calendar year, the weight of batteries placed on the market is the average weight per last three years.

1,696 t
Total take-back

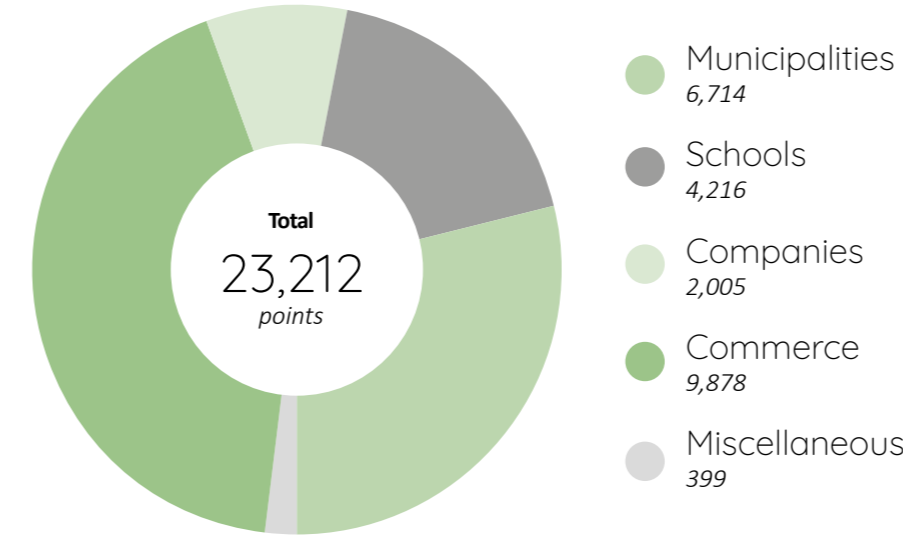
In 2019, Czechs returned 1,696 tonnes of used batteries for recycling, which is an all-time record. The weight is four times higher than 10 years ago.

The amount of batteries that were sorted and returned for recycling in the Czech Republic in 2019 corresponds to the weight of **11 blue whales, 424 Asian elephants or 8,480 lions**. We keep improving every year!

In 2019, the whole of the Czech Republic collected **1,696 tonnes** of batteries. Every inhabitant of the Czech Republic sorted 159 grams of batteries on the average, which corresponds to approx. 6.5 mignon (AA-sized) batteries.

The best sorting results were achieved by inhabitants of the Highlands region with **271 grams per capita**, the worst results in Moravia-Silesia with mere 70 grams per capita.

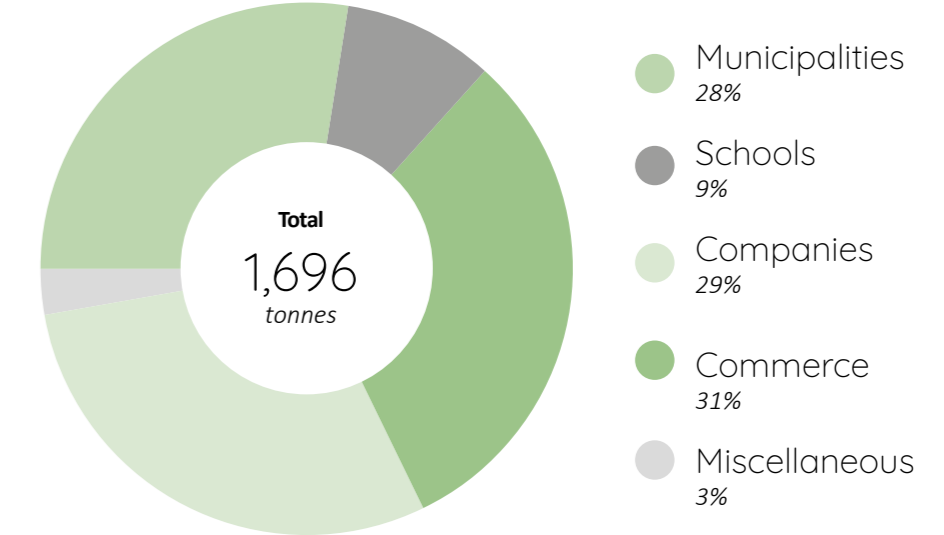
+ Structure of collection points



Map of collection points

Do you need to find the closest battery collection point? You can easily find it using the search engine on mapa.ecobat.cz. Has the location of a collection container changed or has it been removed from your neighbourhood? The interactive map also allows you to record such information. Please help us keep it up-to-date.

+ Collection channels



ECOBAT has cooperated with other collective schemes with the aim of increasing the efficiency of collection and logistics linked to transportation of used batteries. People can therefore also return batteries to ASEKOL and ELECTROWIN collection containers intended for small electrical appliances. The red outdoor containers with an opening for insertion of batteries are particularly popular.

The year-on-year development in battery collection was most significant in towns and municipalities, with an increase of **14%**. This is mainly due to the approach of many city hall councils, town and municipal authorities, which are actively involved in awareness-raising campaigns and motivate citizens to sort waste, including batteries. Schools, where collection rate grew by **10%**, ranked second.

+ Safety hazards

Handling of lithium batteries is associated with an increased fire safety hazard. Lithium batteries contain chemical substances that are considerably reactive (metallic Li) or flammable. Mechanical damage to or mutual short-circuiting of batteries during collection or storage can pose a risk.

Both in foreign countries and the Czech Republic, fires caused by mishandling of lithium batteries were reported. The incidents did not take place in standard sites used for collection of consumer batteries but in sites where a large amount of lithium batteries is stored.



Risk factor A

Primary cells contain metallic lithium (2–3%), and sometimes also chlorine. Lithium is flammable and reacts strongly with oxygen, forming hydrogen. Secondary cells (accumulators; Li-Ion, Li-Pol) contain lithium salts and organic solvents which have a very low flash point (even 25°C).



Risk factor B

When collecting waste lithium batteries or used electrical equipment including such batteries, it is very difficult to prevent their mechanical damage or short-circuiting.



Incident

Heating up of lithium cells and reactions of chemical substances with oxygen cause fires and explosions.



Sites at risk

Warehouses, sorting lines, service areas or centres collecting used batteries, electrical appliances and electronic waste.

+ ECOBAT – comprehensive and professional services

Our preventive procedures are designed in close cooperation with professional partners

ECOBAT is the largest organisation ensuring battery collection and recycling in the Czech Republic. In the area of safety and fire protection, it shares experience with and draws knowledge from its partners from Czech and international professional associations, including the European association EUCOBAT, of which it is a member.

When developing preventive procedures, ECOBAT cooperates with:

- Public administration bodies (Ministry of the Environment, Ministry of Industry and Trade);
- Fire Rescue Service of the Czech Republic;
- University of Chemistry and Technology;
- Private sector research institutions or businesses.

Risk prevention trainings

ECOBAT now offers trainings focusing on safe handling and storage of lithium batteries to anyone who identifies an increased presence of potentially hazardous batteries in their facility. Trainings are designed for instance for representatives of waste management companies, collective systems, waste yards, e-waste processors, service centres, etc.

Specific solutions for operating companies

We provide individual consultancy focusing on safety, including the manner of storage and handling of batteries, and emergency preparedness. Apart from standard collection containers, we now also offer special sheds – Battery Home II and IV. We will take care of their delivery and assembly. We also provide special materials for battery short-circuit prevention, including vermiculite which can be spread on batteries in storage boxes.

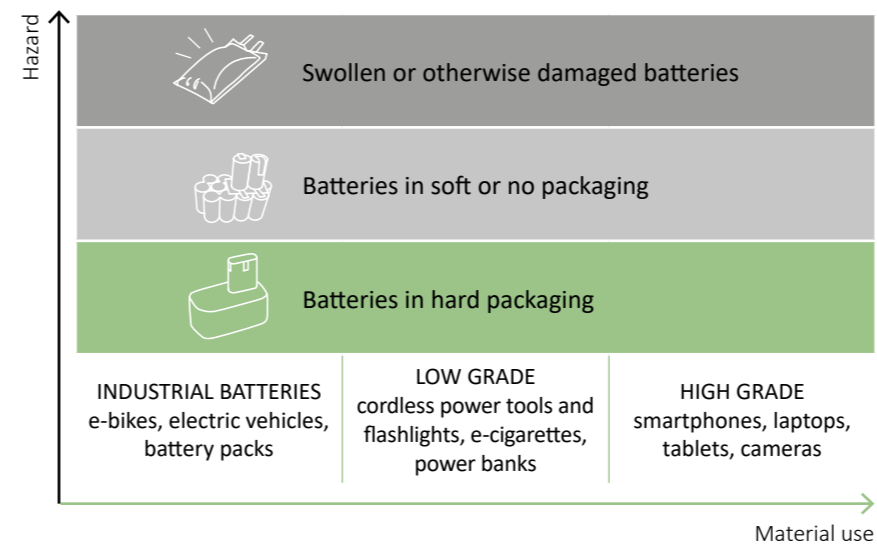
Apart from our standard collection points, we have approx. 100 sites with increased occurrence of lithium batteries. There are three sites in the Czech Republic where dozens to hundreds of tonnes of lithium batteries are stored and sorted per year.

There is evidence of many cases where a Li-Ion battery ignited or exploded without being apparently mishandled, e.g. mechanically damaged. Such cases can be explained by the **thermal avalanche effect**: the temperature in a battery rises uncontrollably as a result of exothermic reactions within the battery. Amplification of the thermal avalanche effect within a Li-Ion pack may result in the re-ignition of previously extinguished fire. In addition, the thermal avalanche effect can have a considerable delay, e.g. following mechanical damage to the battery, and cause fire even after a very long period of time.

+ How to sort lithium batteries

In order to achieve the most efficient material use and safe handling, rechargeable lithium cells and batteries must be sorted out.

Diagram: Battery categories according to hazard level and material use

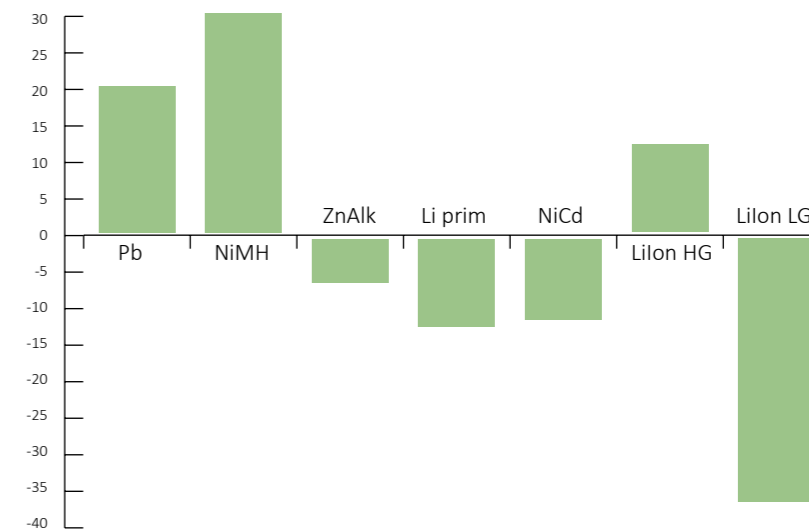


After sorting, all types of lithium batteries must be stored in barrels filled with special material – vermiculite. Batteries must be sorted to barrels as per category and provided with accurate labelling.

Damaged, swollen batteries, including those in soft packaging, need additional security. Each battery should be individually wrapped in plastic packaging. If a battery has naked metal connectors, they must be insulated.

+ Cost of recycling

Market value of sorted batteries (CZK/kg)



The market value of sorted batteries varies greatly depending on their type. In the long term, all types of lead accumulators have been a good value. Certain types of carefully sorted Li-Ion batteries (HG) are also profitable, provided that they contain a larger amount of cobalt that is in demand on the market. The highest profitability is shown by Ni-MH batteries, but their share in the pool of collected batteries does not exceed 3%.

Recycling of most types of chemical batteries is currently loss-making. Recycling companies charge their suppliers with considerable fees, because the value of harvested metals does not cover the costs associated with their processing. In the case of Li-Ion cells and batteries (LG) used in accumulators for hand tools, e-bikes and other e-vehicles, they charge extremely high prices exceeding CZK 35/kg.

+ ECOBAT and awareness-raising

In 2019, ECOBAT spent more than 6% of its turnover on awareness-raising activities for battery sorting and recycling. The key project was the Recycle with Fun to Clean Up the World (Recyklohraní aneb Uklidíme si svět) program for schools, which ECOBAT has supported for 12 years. Recyklojízda (Recycling Tour), a project combining cycling, recycling and awareness-raising, as well as Baterkománie (Battery Mania), comprising battery collection for charitable purposes, aimed at enhancing battery collection efforts in regions.

Traditionally, ECOBAT joined the European Battery Recycling Week. We also launched a brand new project Nejsme líní (We're Not Lazy). We presented brief photo and video stories of several inspiring personalities, as well as ordinary persons, to remind others that we all should start protect the environment by sorting waste.

As in previous years, we helped people sort our batteries by sending them our Ecocheese box for free. ECOBAT communication efforts included awareness raising via media and social networks.

As far as battery sorting is concerned, Czechs have improved a lot, which is great! This is significantly supported by efficient awareness-raising strategy! And ECOBAT has a good one: Baterkománie ranked second at Czech Public Relations Awards 2019 (LEMUR) in the category of State Administration, Politics, and Not-for-Profit Sector.



+ Baterkománie

Baterkománie is an example of how to raise awareness of waste sorting in regions, towns and municipalities in an alternative way. It combines battery collection, competition among towns and charity. It encourages people in regions to bring used batteries to collection points for recycling – in an unconventional way. For each kilogram of collected batteries, the organisers of the competition (always comprising the ECOBAT not-for-profit organisation and a specific region) donate CZK 10 to selected charitable or public-benefit projects in the given region, up to the amount of CZK 100,000. In 2019, Baterkománie took place in the South Moravia region and involved 19 municipal and town authorities, as well as Brno city district authorities.

And how did Baterkománie go in the South Moravia region?

We installed battery collection containers with the project logo at the premises of the participating authorities. Staff members, as well as other people, used the containers to return used batteries. Between May and October 2019, a total of 12,331 kilograms of batteries were collected, which is three times the amount collected in a similar period of the previous year. According to the competition rules, the financial contribution was divided among three selected projects: CZK 50,000 for rehabilitation of little Garik from Velké Pavlovice (near Hustopeče), who was born with polio; CZK 30,000 for construction of park benches in Velká nad Veličkou; and CZK 20,000 for therapeutic aids for 10-year-old Markétka from Břeclav, who suffers from a congenital mental disorder.

Baterkománie has been offering a helping hand since 2018.

The first Baterkománie took place in 2018 in the Highlands region, the second one in 2019 in the South Moravia region. In 2020, Baterkománie continues in the Moravia-Silesia region. In the first two years, CZK 205,505 was distributed among charitable or public-benefit projects. Most of the money went to help children and young people struggling with serious diseases. Part of the funds went to public-benefit projects, such as tree planting, public space development or social services. We would like to extend many thanks to the employees of the participating authorities for doing such an excellent job in terms of promotion of Baterkománie, battery collection and nominated projects.



+ Recyklojízda

In order to support the sorting and recycling of batteries, a three-member team of cyclists on e-bikes crossed the Czech Republic from East to West in June 2019. In 10 days, they visited 25 towns, travelled 786 kilometres and collected 2,467 kg of batteries from citizens, town and school representatives. Recyklojízda packed with awareness-raising activities started in Český Těšín and ended in Ostrov, a town on the opposite side of the Czech Republic at the foot of the Ore Mountains.

In all towns, Recyklojízda members held half hour meetings with residents, municipal officials and in most cases also with children from kindergartens, elementary or secondary schools. Recyklojízda bikers had prepared Ecocheese boxes for sorting batteries in households, which they handed out to passers-by for free. Recyklojízda was an open project, and if, in addition to collecting batteries, some athletes wished to create shared experiences, they could join the Recyklojízda team and travel part of the journey on a bike or e-bike.

Recyklojízda in 2019 completed a three-year cycle. Between 2017 and 2019, Recyklojízda members travelled the Czech Republic from one end to the other on e-bikes three times. They visited 72 towns, travelled 2,400km and collected 7.5 tonnes of batteries. Recyklojízda promoted collection of batteries in the regions of Bohemia, Moravia and Silesia and cultivated relations with representatives of towns and municipalities.



+ Nejsme líní

The new project We're not Lazy (Nejsme líní) tried to address people resisting the notion of sorting and recycling. It started in the second week of September as part of the European Battery Recycling Week. The project introduced several inspiring personalities leading by example and showing that if a person is not lazy, s/he can do great things for the environment.

Short videos on social networks featured for instance Miroslav Kubásek, the founder of the Let's Clean Up Czech Republic project. Or actor Petr Vacek, who believes that there is one thing even more important than waste sorting – avoiding creation of waste. The inspiring personalities included teacher Lenka Hrnčířová – the holder of the “Environmental Educator of the Year 2018/2019” award. Their stories gradually appeared on #nejsmelini Instagram profile and ECOCHEESE FB profile. Other people were also welcome to join the initiative. Their photographs and stories were also presented within the project.

Yet the motto “We are not lazy, we sort batteries!” had appeared in ECOBAT communication a little earlier – it became the motto of Recyklojízda 2019 already in June.



+ Recyklohraní

For 12 years now, ECOBAT has supported the Recyklohraní program that teaches children from kindergartens, elementary and secondary schools how to sort batteries and small appliances. At the same time, it teaches them how to reduce waste. It provides methodological support to teachers in the field of environmental education. The most active ones are presented with the “Environmental Educator of the Year” certificate.

As part of Recyklohraní, ECOBAT also co-organised a 3-month collection campaign held in autumn. During the campaign, schools returned for recycling nearly 60 tonnes of used batteries. To raise awareness, ECOBAT and its partners also held a challenge called “Recycling Newsletter”. Pupils and students became editors, reporters, photographers and graphic artists of their own school magazines focused on environmental protection. The newsletters could be in paper or electronic forms.

The only condition was that at least half of the contents should be devoted to the sorting of batteries or small electrical appliances. The children also strived to promote the European Battery Recycling Week. In total, 560 schools took on the challenge and 694 completed tasks were handed in.



+ Ecocheese

The main ambition of the Ecocheese project is to make life of families and individuals easier when sorting batteries at home. For the ninth year in a row, people have been able to ask for an attractive Ecocheese box for free. They can store waste batteries there at home before taking them to one of the public collection points. In the Czech Republic, ECOBAT will deliver Ecocheese to their mailboxes upon request. During the existence of the project, ECOBAT has already distributed hundreds of thousands of boxes in this way.

People can currently choose from four colour designs – green, blue, pink or with goldfish. The project has its own website: www.ecocheese.cz. There is also the ECOCHEESE FB profile. However, the impact is much wider. ECOCHEESE concerns not only collection containers, but also the sorting and recycling of batteries in a broader context.

In order to develop cooperation with towns and municipalities, ECOBAT also distributes Ecocheese boxes to town and municipal authorities. They are then distributed among residents to encourage sorting.





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