

It is not yet known exactly how lithium will be obtained from the mineral Jadarite found in the valley of the river Jadar. Rio Tinto's official website states that top technologists in Australia are working on a technological process that should be economically viable and environmentally responsible.

In 2004, the mining company Rio Tinto discovered a unique deposit of a new mineral called "Jadarit" (lithium-sodium-borosilicate mineral) in the valley of the river Jadar near Loznica. Fifteen years later, the project is in the Preliminary Feasibility Study phase, and as Rio Tinto points out, significant investments are needed to continue the analysis and development of the project, ie the future mine. The company communicates very discreetly with the local community, and it is mostly meetings with the local government and "Open Days" when experts from various fields meet with the local population from Gornji Jadar, while in the local media the company is mostly presented in a positive light, a chance for Loznica and the whole local community.

Lithium-ion batteries for electric cars are currently considered in the world as a promising alternative to cars that run on fossil fuels with a large greenhouse effect, and in that sense, the demand for lithium in the world is increasing. Some estimates say that carbon emissions from cars will be reduced by 71% by 2050 compared to 2013, due to the popularization and use of electric cars with a lithium-ion battery. Electric car sales exceeded 2 million vehicles in 2016, with a projection to grow to between nine and 20 million by 2020, and between 40 and 70 million by 2025 (IEA 2017). In this regard, there is a demand for lithium batteries of 790% in the last ten years. Lithium consumed in battery production increased from 5,160 tons in 2007 to 1,980 metric tons in 2017 (Jaskula 2018). However, the largest sector of global demand for lithium batteries is "consumer electronics" (69%) while the second is "automotive" with 28%. The projected annual growth rate predicts an increase in the market share of lithium batteries for cars from 22% to 41% by 2020 (NREL 2015). However, what little is said and known, and what worries environmentalists, is the recovery / recycling rate of lithium-ion batteries, which is still expressed in single digits even in the richest countries in the world.

### **Chemical processes of lithium extracting**

Commercial lithium comes from two main sources: underground salt deposits and mineral ore deposits. A huge amount of today's lithium is extracted from the reservoirs of liquid salt water that are located under the salt flats, better known as saline, most of which are located in south-western South America and China. Other sources of salt water rich in lithium include geothermal and petroleum physiological coulters. Recovering a lithium solution is

usually a simple but time consuming process that can take anywhere from a few months to several years. Drilling is required to access the underground deposits of solar saline, and the solution is then pumped to the surface and distributed to the saline. The brine remains in the evaporation lake for several months or years, until most of the liquid water is removed by solar evaporation. Solar saline solutions are very concentrated and in addition to lithium, they usually contain potassium and sodium. The lithium solution is finally treated with a reagent, such as sodium carbonate, to form lithium carbonate, and the product is then filtered and dried for sale. After completion of the lithium extraction procedure, the remaining solution is returned to the underground tank.

Although they make up a relatively small part of the world's lithium production, mineral ore deposits produce almost 20 tons of lithium per year, and over 100 different minerals contain some amount of lithium. Mineral ore deposits are often richer in lithium content than saline, however, they are expensive to access because they must be extracted from solid rock formations. Due to the additional consumption of energy, chemicals and materials involved in the extraction of lithium from mineral ore, the process can incur twice the cost of saline recovery, a factor that has contributed to its lower market share.

The process of extraction / separation of lithium from ore may vary based on the specific mineral deposit. In general, the process involves removing mineral material from the ground, then heating and shredding. The crushed mineral powder is combined with chemical reactants, such as sulfuric acid, then the suspension is heated, filtered and concentrated through an evaporation process to give marketable lithium carbonate, and the resulting wastewater is treated for reuse or disposal. Since the ore was found in our region with a specific composition, the technology of extracting lithium from jadarite is still unknown and is being tested at the Technological Development Center "Bundora" - Melbourne in Australia. According to the official presentation of Rio Tinto, the standard technological scheme of processing showed that it can produce high quality products with the expected degree of utilization of useful components, while the second campaign introduced two innovative processes that gave results above all expectations. However, it is not known what these technological processes entail.

Seawater - Hundreds of billions of tons of lithium are found in the oceans around the planet, making them an attractive source for meeting future lithium needs. Although existing processes (including precipitation extraction and hybrid ICS-sorption process) have succeeded in efficiently extracting lithium from seawater, newer technologies involving the use of membranes have shown a tendency to reduce the cost of extracting lithium from seawater.

## **Impact of lithium on the environment**

Over the past decade, global saturation with smartphones and all other technological devices has resulted in high demand for lithium-ion batteries. With the global trend and the inevitability of switching to renewable energy sources, this demand will only increase. This means that the lithium mining industry is currently on the rise. Large deposits in China and South America are being intensively exploited in order to try to extract the maximum amount of lithium from the Earth - but this has great consequences for the local environment and nature protection. Extraction techniques that require energy and the side effects of contamination light a red light in all local environments where mines are planned and require constant monitoring of the mining industry, which will be crucial in today's increasingly environmentally conscious world.

According to currently developed technologies, about 500,000 liters of water are needed to extract one ton of lithium. Such needs for water in local environments also affect farmers, who in this way are deprived of valuable resources for cattle breeding and crop irrigation. In addition, the toxic cocktail of chemicals used to extract lithium from the ground is also capable of infiltrating nearby rivers, streams and water supplies. This is exactly the kind of catastrophe that happened in 2016 on the Lika River in Tibet, where mining operations contaminated the water and resulted in thousands of dead fish and many poisoned cattle. This is the third time in seven years that such an environmental accident has occurred in China.

Of course, environmental activism and the vigilance of the local community in monitoring the condition of rivers can help reduce the risk of such outcomes, but they cannot completely eliminate them. Even in areas where lithium is extracted from stone, chemicals are still a key part of the process. A recent report on the effects of a lithium mine in Nevada determined pollution by an operation up to 200 kilometers in diameter.

All these data point to increased vigilance and activism of the local community in the Jadra Valley, but as things stand, they are much wider (primarily the Jadra, Drina and Sava basins) when it comes to this mining project. If it is known that the mine in Zajača is being prepared again for lead smelting, another mining plant in the Loznica area could mean a complete ecological devastation of the entire area. The local community must be more actively involved in each phase of this very large mining project, in order to take into account its interests, environmental protection and the benefits that such a project would bring to the local community in relation to all potential dangers of this type of exploitation.

Source: [pakt.org.rs](http://pakt.org.rs)

## Impact of lithium extraction process on the environment