Lithium, rare earth elements, chromium, arsenic, cobalt, titanium, selenium and magnesium have seen enormous expansion in production volume ranging from 33% (for magnesium) to 208% (for lithium) in the last decade, but even that is small in compared to the projected increase in demand by four to six times in the context of the needs of the green transition. At the same time, the global production of certain critical raw materials, such as lead, natural graphite, zinc, ores and concentrates of precious metals, as well as tin, recorded a decline during the last decade.

Global production of critical raw materials has become more concentrated, highlighting the critical role of international trade and supply chains in the processing and delivery of these materials, but also exposure to disruptions in higher supply chain segments.

Global production of critical raw materials is concentrated in a few countries, some of which have a large share of the production of more than one critical raw material. **China,** for example, is among the top three producers of six out of ten critical raw materials, while Australia and Russia appear three times, and South Africa and Zimbabwe twice.

On the other hand, trade in these materials remains generally relatively well diversified. This suggests that the possibility of significantly disrupting the **global green transition** due to disruptions in import or export flows of critical raw materials is limited. However, the concentration of exports and imports is a significant factor when it comes to the supply of some critical raw materials – this particularly applies to lithium, borates, cobalt, colloidal precious metals, manganese and magnesium.

Thanks to this, industrial raw materials have again come to the center of political discussions, for several reasons. Achieving net zero carbon dioxide emissions by 2050 will require a significant increase in the production and international trade of several raw materials that will be critical to the transformation of the global economy – from one dominated by fossil fuels to one driven by renewable energy technologies.

Such technologies are generally more mineral intensive than fossil fuel technologies. For example, a typical electric car requires six times the mineral input of a conventional car, and an onshore wind farm requires nine times more mineral resources than a gas-fired power plant.

Thus, while the green transition will reduce global dependence on fossil fuels, it will increase pressure on the production and efficient international exchange of other raw materials.

Certain raw materials that traditionally support industrial production (such as aluminum, copper and iron ore and steel) will also retain their essential importance in green sectors. Other materials, such as rare earth minerals (especially neodymium and dysprosium),

lithium, cobalt or nickel, are also prevalent in new technologies and therefore demand for them is expected to increase significantly. **The International Energy Agency** predicts that in the next twenty years the demand in the clean energy sector for materials such as cobalt, natural graphite or lithium will increase by twenty to forty times.

Depending on the assumed pace of the green transition, it is estimated that the demand for minerals from the energy sector, as well as from other sectors, will increase by an average of four to six times between 2020 and 2030. However, export restrictions could play a significant role in international markets for critical raw materials, affecting the availability and prices of these materials.

Serbian development chance

Mining in Serbia is often seen as a development opportunity, but there is no social consensus on these issues. While the government supported mining with concrete systemic solutions in previous years, an unexpectedly strong protest by the local population and environmental organizations managed to stop one of the few mining projects of world importance in the country – the lithium mine in the Jadar valley.

Serbia positioned its performance on the **"lithium platform"** on the development of electromobility, i.e. batteries for electric vehicles.

The status of this project, which has been formally stopped, is still not completely clear, because environmental organizations claim that the investor, the global giant **Rio Tinto**, has extended the deadline for obtaining a permit for lithium mining.

Even in the midst of the fiercest conflicts over the fate of the mine, opinions could be heard that the opposition to the project was caused by, first of all "disastrous technology, which has been applied in the world so far" and which would threaten to destroy this area for future generations. At that point, there was hope that the project could see the light of day if new, best available technologies (BAT) were applied to lithium ore extraction and processing.

In this context, the company **Rio Sava** Exploration previously announced that it is working on the global level to develop conceptual solutions for waste treatment technology, which will turn it into a harmless material.

At the center of the conflict over the lithium mine, there were also some moderate positions. In his speech, distinguished professor Dr. Čedomir Beljić said that the benefits of mining are great and indisputable, but that "environmental protection must be imperative and the control of institutions strengthened." He reminded that Serbia is a mining country. – In the foundations of the Serbian state is mining, it is neither a myth nor a colorful lie. The state of Serbia was founded on mining, so it is absolutely certain that mining will not stop because

of a new ecological sensibility and for the sake of completely clean or “green” development.
At one time, the **World Bank** made an assessment of the mineral potential of the country, which showed that Serbia has a chance to be among the key European suppliers of lithium and copper. The remaining ore is impressive and includes copper, gold, lead, zinc, nickel, antimony, molybdenum, borate, magnesite, phosphate, fluorite and graphite.
Thus, more radar projects are developed under the radar of the public. Some mines have already started working. For example, the key supplier of lead and zinc is the **British company Mineco**, which opened its fourth mine in the country in 2020 – Suva Ruda mine in Raška.
Confirmed copper reserves in the eastern part of the country reach 1.35 billion tons. Gold is exploited in the mines of Bor, where the American Freeport McMoran has determined reserves of about 98 tons. In 2019, **China’s Zijin** bought the lower zone of the Cukara Peki copper and gold deposit from Freeport, and the mine was opened in 2021.
In addition, geological reserves of molybdenum ore amount to about 1.2 billion tons, and antimony to about 4.1 billion tons. Off-balance sheet reserves of nickel, a metal for which there is great demand in Europe, reach about 27 million tons. These investigative projects have also been quietly shelved away from the eyes (and ears) of the public.
Serbia also has significant reserves of graphite, which is on the European list of critical materials – the **Belkalhan mine** is based on a high-quality graphite deposit, with 4 million tons of reserves confirmed on only 25 percent of the project site.
However, the biggest challenge for strengthening the Serbian mining sector remains bridging the gap on the long and uncertain path from exploration to exploitation. Strengthening public information about the importance of **mining projects** for the overall economic development of the country, strengthening institutional control in terms of compliance with environmental criteria, attracting foreign investors and harmonizing the legislative framework in the mining and environmental protection sectors are key prerequisites for the development of mining and the positioning of the country on the **European map** for supply of key raw materials. After fulfilling these requirements, it is necessary to consider the construction of processing capacities to create additional value.