

*A ramp up of the supply of critical raw materials (CRMs) is essential for the world's energy transition. Wind and solar, batteries, digitalisation, transport and hydrogen cannot meet their targets without it. **The EU defines 30 minerals as critical.** To give one example, the global deficits in lithium supplies could surge more than 60-fold to 950,000 tons by 2030. **Frank Umbach at EUCERS** takes a thorough look at the issue. Europe represented just 5% of global mining in 2020 and is the only region in the world with a declining mining industry. **Europe's dependence on imports makes it vulnerable to economic and geopolitical shocks and rivalries.** At present, China provides 98% of the EU's supply of rare earth elements (REEs) and around 62% for all its defined 30 CRMs. Recycling and import diversification is needed but can only have a limited effect. Umbach says that's why **the EU needs to support domestic mining, processing, and refining capacities as part of its "Open Strategic Autonomy" plan**, aimed at addressing these issues. Umbach points at the **Norwegian "Bjerkreim Exploration Project"** which sits on more than 70bn tons of mineralised rock and might turn out to be one of the world's most significant deposits of vanadium, titanium, and phosphate. Though some NGOs and Green parties oppose mining, **European operations will have much lower eco-footprints than exporting countries with weak regulations.** If CRMs are to become the "new oil", Europe must be ready for that.*

During the last months, **local and regional protests against the permitting of foreign mineral exploitation have widened in Serbia and Spain.** In Serbia, the protests of environmental NGOs and other population groups are directed against Rio Tinto's Jadar lithium project and Zijin Mining's recently opened Cukara Pekki copper and gold mine. The protesters fear a pollution of land and water, though their protests are also fuelled against a populist rule of an increasingly autocratic government in Serbia.

In Spain, in the vicinity of the medieval town of Caceres and in the Canaveral district, foreign investors have also to cope with protests and environmental concerns against **the opening of two of Europe's largest future lithium mines** alongside of a new industrial infrastructure across the region of Extremadura, which also includes battery cell and cathode factories.

Clashing with environmentalism

These new European projects benefit from **unprecedented EU funding** to develop new raw material mines and supply chains in order to **reduce the EU's rapidly rising dependence on critical raw materials (CRMs) and battery supply chains from China and Asia.**

The protests highlight a growing dilemma for the EU as well as for many environmental groups and NGOs: **a growing conflict of competing objectives** between local and regional environmental interests on one side and the need for global climate change mitigation and decarbonisation efforts on the other side.

A faster decarbonisation in Europe and the world demands a rapidly increasing mining of CRMs for **renewable energy sources** (such as wind and solar power) and many **digitalisation technologies** to enhance energy conservation and efficiency of the future electricity demand in all industries and high-tech sectors (including the European **defence, air, and space industries**). With the electrification of the European **transport** sector and **energy intensive industries using green hydrogen** (based on electrolysis), **the future EU electricity demand might even double by 2050** according to new analyses of the European Commission.

In this light and given the rising geo-economic and geopolitical competition with China and the EU's dependence on ever growing imports of CRMs and refined products (such as magnets for windmills) from China, **the EU has enhanced its raw material policies to a core issue** in its industrial as well as energy and climate policies due to the European Green Deals' targets for emissions, the expansion of renewables and electromobility.

Recycling, diversification of import sources, European mining

The EU also wants to reduce its CRMs demand growth by introducing a **circular economy** with much more recycling and re-use of CRMs, **diversify its imports and expand its domestic mining in Europe**.

Many environmental groups are not only against fossil fuels, but also against raw material mines and believe that future recycling and re-use of CRMs alone can balance off the CRMs mining and supply demand growth. However, that appears completely unrealistic at least in the next decade as **recycling and re-use as well as other alternative options to reduce the demand and imports of CRMs all face numerous challenges and constraints**.

Furthermore, **larger amounts of replaced batteries, solar cells and wind turbines will become available only after 2030**. While the introduction of a circular economy is of the utmost important for both climate and industrial as well as supply security reasons, it won't be a 'silver bullet'-solution for the rapidly growing European demand of CRMs and its related supply security risks during the next decade.

In this context, **the protests of environmental NGOs and others also overlook the geo-economic and geopolitical developments and the inherent risks for Europe's industries and future key economic growth sectors**. In combination, the political

blockade of European mining projects of CRMs even threatens the EU's own energy and climate targets of the European Green Deal (EGD) as a pre-condition of the global climate policies and its 1.5°C target and will only lead to higher global emissions.

Chinas dominates the world's supply of CRMs

Since the spring of 2021, **Beijing has considered new export controls of its rare earths elements (REEs)** and semi-finalised products such as **magnets**, which are particularly important for the defence and renewable industries. China had already increased its production quota for these CRMs by almost 30 percent up to 140,000 tons (from 100,000 tons) under its five-year plan through 2020. **Beijing seeks to adopt defensive measures against new US trade sanctions** but also to cope with **its rapidly rising demand of high-tech products (such as electric vehicles and renewables)** which all need rare earths and other CRMs. By 2030, the rare earths production needs to increase from its present 167,000 tons up to 280,000 tons.

China already threatened the US with export restrictions on rare earths in May 2019 due to the escalating trade conflict with the Trump-administration. In 2010, China had stopped its REEs exports to **Japan** amidst a diplomatic conflict with Tokyo over maritime territories with oil and gas resources in the East China Sea. At that time, China enjoyed a worldwide production and refining monopoly on REEs for 95%.

Rare earths are just one example how Chinas dominates the world's supply of CRMs. At present, **Chinese companies control up to almost 80% of the worldwide REEs production**, more than **90% of its refining processes**, around **80% of global refined cobalt production**, and more than **60% of the worldwide lithium-ion manufacturing capacity**. China is the only superpower which has positioned itself strongly throughout the entire clean tech supply chains based on CRMs. In 2018, **the European Commission's Vice-President Maros Sefcovic in 2018 already warned that CRMs may become the "new oil"**. It highlighted the future geo-economic and geopolitical challenges of the EU's raw material supply.

In contrast to Western government policies and their defined short-term priorities in economic decision-making, **China's political and economic policies are guided by long-term thinking** and strategic concepts such as the strategic control of the most important supply chains for disruptive technologies and related CRMs. **China's leader and reformer Deng Xiaoping already stated in 1992: "The Middle East has oil, China has rare earths."** From the mid-1980s to early 2000, **China artificially deflated the cost of REE exploration and production so that Western companies and mines had to close.**

Since then, they have dominated global REEs production also due to its **tolerance towards highly polluting, low-cost mining of REEs.**

When Beijing had widened its export restrictions to the US and the EU in 2010, the question of supply security of REEs and other CRMs was addressed on the highest political agenda of the US and EU. But after 2012 when the prices of CRMs were falling again, Western concerns on a stable supply of CRMs disappeared again from the governments' strategic agendas.

In 2015, **China's industrial strategy 'Made in China 2025' called to Chinese companies to ensure 70% of the components and materials being used should be sourced domestically** by 2025. In April 2020, President Xi Jinping called for the need to enhance the dependence of the Western countries' global supply chains on China and, simultaneously, "develop powerful retaliation and deterrence capabilities against supply cut-offs by foreign parties". In December 2021, Xi Jinping demanded to ensure China's self-sufficiency in key commodities, including energy and minerals to prepare for the changing international relations as part of the country's long-term agenda and its "comprehensive conservation strategy" .

China's global mining strategy

Since 2021, amid the worldwide Covid-19 pandemic and worsening global shortages as well as surging raw material prices, **China has intensified its acquisitions of new CRM mines around the world** for ensuring and controlling access of new lithium and other CRM deposits.

Due to the global demand growth for electromobility and batteries for vehicles and other energy storage needs, **the global deficits in lithium supplies could surge more than 60-fold to 950,000 tons in 2030.** It could threaten the acceleration of the worldwide energy transition and decarbonisation.

China is also willing and has partly been forced to pursue ventures and less profitable FDI-projects for enhancing its geo-economic autarky and self-sufficiency, which Western companies and governments perceive as politically and financially too risky. Thus, Chinese companies are also interested at **Afghanistan's untapped mineral abundance**, including its estimated vast reserves of copper and lithium. **The Taliban - being blocked by Western countries to use its foreign currency reserves in international banks - have presently hardly any other choice than to deepen and expand its political-economic ties with China.** New value estimates of Afghanistan's mineral wealth run high up to US\$3 trillion and may rise further with the global demand growth and skyrocketing prices.

Afghanistan has even been called **the ‘Saudi Arabia of lithium’** because its estimated lithium reserves could be worth solely US\$1 trillion and be as large as Bolivia’s, home of the world’s largest reserves.

China’s interest at Afghanistan’s risky mineral resources have been highlighted by a recent warning of the Chinese embassy in Kabul towards Chinese mining companies in December against “blindly” organising inspection trips to Afghan mining sites, thereby ignoring regulations and the need for permits for examining its mineral resources. For China, it offers the perspective to expand its global dominance of the world’s most important CRM supply chains and **reduce its dependence on more vulnerable maritime supply routes for its CRM imports from Africa, Latin America, and Australia**. Having already invested in Afghanistan’s mining sector during the last decade, a Chinese control of Afghanistan’s CRMs could make the EU even more dependent on China in its struggling efforts for securing its future raw material supply.

The EU’s “Open Strategic Autonomy” plan

The worldwide energy transition and decarbonisation have fuelled a global race for the most advanced technologies, and a stable supply of CRMs for them. The worldwide decarbonisation of the global energy sector and economy with a shift to cleaner energy may create **a multi-decade commodity (super)cycle and increase the global geo-economic competition and geo-political rivalries**. The EU’s strategic objectives of its EGD and the further expansion of renewables can only be realised with a rising use and a reliable supply of CRMs. But the EU competes with a rising global demand alongside the worldwide expansion of renewables, digital technologies, and artificial intelligence as well as other high-tech industries.

Only 9% of the EU’s overall raw material demand can be supplied by the EU-27 itself. Europe represents just **5% of global mining in 2020** and is the **only region in the world with a declining mining industry**. At present, **China provides 98% of the EU’s supply of REEs, and around 62% for all its defined 30 CRMs as of 2020.**

Its demand for lithium will grow 18 times and cobalt 5 times by 2030 and respectively 60 times and 15 times by 2050. Demand for rare earths could increase 10-fold by 2050 and cobalt a demand growth by 500% by 2030 and 15 times by 2050. Despite creating a circular economy with expanded recycling capacities and European production as well as refinement capacities, they won’t be sufficient to guarantee a sufficient stable supply for the EU industries.

Covid pandemic: a wake-up call

The EU's dependence on critical supply chains have been highlighted after the outbreak of the Covid-19 pandemic when the global just-in-time supply chains had not been able, flexible, and fast enough to provide sufficient medical equipment, basic medicines, and CRMs in time due to sudden global demand, nationalist export restrictions and broken value chains.

Since that time, **detailed analyses of major supply chains and the EU's dependencies on critical supplies have been conducted** with the conclusions of a greater "open strategic autonomy" and relocating some critical supply chains (including mining as well as refining capacities) to Europe for diversifying supplies and technologies as well as for strengthening Europe's resiliency of supply chain security. In the EU's understanding, "strategic autonomy" does not mean complete self-sufficiency or economic protectionism by isolating itself from the world. It rather means **having alternatives, competition, and avoiding "unwanted dependencies both economically and geopolitically"** as outlined in the EU's new "action plan" for CRM supply security of September 2020.

The EU's rising geo-economic concerns have also been reflected in its list of CRMs, which is being updated every 3 years. **The number of CRMs has constantly risen from 14 CRMs in 2011 to 20 in 2014, 27 in 2017 and 30 in 2020.**

Creating and supporting domestic mining, processing, and refining capacities

By developing and expanding European mining of CRMs whilst diversifying its imports, the Commission hopes to **become 80% self-sufficient on lithium by 2025 and have its own rare earths mining as well as refining capacity ready by 2030.** While the EU and Europe have lithium, borate, and even REEs, **hardly any of the newly identified and potential mining projects is likely to enter production in the next three years** for various reasons. And even then, **for at least some of its CRMs, the EU will still lack its own abundant mineral deposits.** But the commerciality of domestic mining projects in Europe can change as it depends on its policies, regulatory frameworks, financial support and global price developments.

Compared with the lack of public acceptance in Serbia and Spain, a more positive example can be seen in the **Norwegian "Bjerkreim Exploration Project"** of the UK based exploration company Norge Mining plc. and its spectacular find. It contains more than **70bn tons of mineralised rock and might be one of the world's most significant deposits of the CRMs vanadium, titanium, and phosphate.** The find also highlights the global significance of Norway's untapped mineral resources can play a future key role in the

supply of the EU's CRM supplies, depending on the political and public support by the Norwegian and EU governments.

Recognising and addressing new conflicts of interests and strategic objectives

The EU's new raw material strategy has also emphasised the need to enhance sustainability in the light of the EGD with a greater attention of the **ecological footprint** of mining, refinement ("**sustainable mining**") and end products.

In principle, **domestic mining of raw materials - in compliance with of adequate environmental regulations** and 'life cycle analyses' - would **significantly emit less greenhouse gas emissions than mining projects outside Europe**, which are mostly less environmentally regulated (resulting in much higher emissions). Additionally, they must be imported via longer distances of transport, which produces higher emissions in combination with their extraction. According to a study of the Austrian Federal Economic Chamber, **1 ton of additional emissions in Europe resulting from increasingly intermediate European products leads to average global savings of 1.24 tons of CO₂ equivalent in all material sectors**. Other research analyses suggest that **each ton of metal Europe produces emits up to 8 times less carbon than its equivalent from China**.

In this regard, a new conflict of interests and strategic objectives is mounting in the EU member states. It might be **particularly challenging for NGOs and Green parties as they need to decide what is more important for them: local nature and environmental protection or effective and sustainable global climate mitigation efforts**. The decarbonisation of the world's energy system as a pre-condition of mitigating global climate change won't be realised without a decrease of imports and increasing domestic mining, refining and processing of CRMs. **Neither the creation of a circular economy nor any other single measure alone will offer a 'silver bullet'-solution to the rising demand of CRMs and achieving the EGD emissions' target.**

Strategic perspectives

The present **worldwide magnesium shortage due to production curbs in China** (having a near monopoly on the global magnesium market) has just highlighted Europe's and the world's overdependence on just one supplier and the Western neglect of diversification efforts. It is an essential raw material for aluminium alloys being used for almost everything.

As the EU's demand for certain CRMs might grow by a factor of 20 by 2030, the need for **developing resilient value chains** (including for renewables, batteries, and other disruptive technologies), resource efficiency, recycling, re-use, repair, substitution, and the

use of secondary sources (as part of its future 'circular economy') will play an ever more important role in the future. However, the options of recycling, re-use and substitution also have their own constraints because **some CRMs cannot be recycled technically or are presently not commercially profitable.**

In addition, the supply and value chains of CRMs are not fully and homogeneously covered by European industry. Moreover, **opening new mines and refining capabilities around the world require lead times of at least 7 years internationally, in Western countries even 10-20 years.** Facing mounting public acceptance challenges in many OECD countries, it has become **ever more challenging to find private investors for those long-term mining projects in Europe.**

While a complete 'strategic autonomy' is neither realistic nor desirable, **a diversification of supplies and imports of CRMs is needed particularly in the mid- and longer-term perspective.** It includes **the expansion of domestic mining, processing, and refining capacities in Europe** for reducing its imports and unwanted geopolitical dependencies as well as for lowering global climate emissions.

For implementing and realising these strategic objectives, **political leadership, guidance, and adequate political support** as well as **public communication strategies** for European mining projects of CRMs, including in Norway, will become ever more important in the forthcoming years as otherwise the EU won't realise its agreed emission target of -55 percent and decarbonisation pathway by 2030.

Source: energypost.eu