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Europe and securing supplies of mineral resources: from strategic urgency to diplomatic pragmatism

[1] For the sake of simplicity, here we have left aside the central issue of decarbonising air and sea transport, as well as that of sustainable fuels, which must be considered in the context of the European ban on internal combustion engines by 2035, and that of hydrogen, whether fuel cells or combustion engines.

[2] This vast undertaking will result in a necessary moderation in the consumption of end products and services (transport) and therefore in the use of non-renewable raw materials, since these mineral resources are exhaustible, their extraction and transformation require energy and their mass influences the quantity of electricity that needs to be stored to be transformed into mechanical energy (and therefore the quantity of mineral resources required).

[3] Krausmann, F., Glingrich S., Eisenmenger, N., Erb, K-H, Haberl, H., Fischer-Kowalski, M. (2009), "Growth in global materials use, GDP and population during the 20th century", Ecological Economics, 68: 2696-2705.

[4] These technologies include NMC (nickel, manganese, cobalt), NCA (nickel, cobalt, aluminium) and LFP (lithium, iron, phosphate), the latter not requiring nickel or cobalt.

[5] According to the Sustainable Development Scenario (SDS), compared with the Stated Policies Scenario (STEPS), which extrapolates the effects of environmental measures already applied or decided on to 2030 and 2040.

It is now a well-known and widely documented fact that if we are to make a success of our energy transition, we need to have abundant access to a certain number of mineral resources. Broadly speaking, the goal of decarbonising our world means overcoming four major challenges:

- The electrification of applications, and in particular that of motor transport, i.e. speeding up the end of the internal combustion engine in favour of electric motors[1].
- The growth of renewable energies and low-carbon energies in the global power mix: offshore wind, photovoltaic and nuclear power generation, as well as various sources of "sustainable heat".
- The development of transmission infrastructures not only for decarbonised or low-carbon electricity, but also for sustainable energy carriers, first and foremost "green" hydrogen.
- The constant reinforcement of energy sobriety, which must go hand in hand with the sobriety of the "materials" used - without this requirement undermining the imperative of economic growth and the development that must accompany it[2] -, as well as more recycling and eco-design.

ENERGY TRANSITION: FROM ONE DEPENDENCY TO ANOTHER?

Insofar as the moderating effect of the fourth pillar cannot compensate for the amplifying effects of the first three, the demand for mineral resources is set to explode over the coming decades, in a context marked by demographic growth and urbanisation

in emerging countries, two structural phenomena which *a priori* imply a growing use of raw materials, both agricultural and industrial[3]. Copper, the "metal of electricity" par excellence, is essential for the first three pillars, while nickel, manganese, cobalt, lithium and graphite, in the current chemistry of lithium-ion (Li-ion) batteries, are essential for the second pillar[4], the boom in electric vehicles. As for rare earths, which are very much a part of both public debate and in the spotlight of the media, they are used - among other things - to produce permanent magnets used in the automotive and wind power sectors.

For example, according to a comprehensive study by [the International Energy Agency](#) in 2021 regarding the role of critical mineral resources in the transition to clean energy, demand for lithium could increase almost 42-fold by 2040, graphite by 25, cobalt by 21, nickel by 19, manganese by 8, rare earths by 7 and copper by 2.6 if the targets announced by a number of countries and companies to achieve carbon neutrality by 2050 are to be met[5].

Faced with this demand for mineral resources, some of which are set to rise exponentially, supply is likely to be severely constrained, creating the conditions for an imbalance with major industrial, economic and geopolitical implications.

However, there are several limiting effects. The first is geological, and therefore ultimately historical in terms of resource depletion, which depends on the intensity of past mining activities and therefore the age of metallurgical activity. From this point of view, the growth in demand for copper, which is much

weaker than that for lithium, cannot be interpreted as a possible indication of less tension in one- or two-decades' time, as copper ore is showing a structural decline in quality due to the very long history of metallurgy.

The second limiting factor is technological and economic. In addition to the well-known difference between mineral resources and mineral reserves[6], the issue is as much one of transforming/refining the material as of extracting it. The central issue for nickel, for example, is that of battery precursors, and therefore mainly that of high-pressure acid leaching plants (HPAL[7]) to transform limonites - or a mixture of limonites and saprolites - into either nickel or cobalt hydroxide (*Mixed Hydroxide Precipitate* - MHP - or *Nickel Hydroxide Cake* - NHC) or mixed nickel-cobalt sulphides (*Mixed Sulphide Precipitate* - MSP). These plants are an essential route for obtaining nickel sulphate while recovering the cobalt contained in these ores, but they are particularly expensive and technologically complex. Their profitability is *de facto* dependent on the price of nickel and its co-products, namely cobalt.

The availability of mineral resources also has a geopolitical dimension on both the supply and demand sides. On the producer/exporter side, the radiant future promised to these raw materials of the energy transition justifies the implementation of bans or restrictions on exports of unprocessed resources on national soil, following the example of the ambitious industrial strategy pursued for several years by Indonesia. At the same time, on the consumer side, there is global competition for access to these resources.

China enjoys a dominant position in many strategic metals sectors, particularly refining. This geopolitical approach needs to be backed by financial analysis, since it is above all the geography of capital in the mining and metallurgy sectors that matters. From a European perspective, we have to recognise China's metallurgical power, the omnipresence of its interests in the international extractive industries - particularly in Africa, as in the Democratic Republic of Congo - and the growing power of other countries, particularly

the United States in view of the [strong partnership strategy with Australia](#) which could join Canada in the list of countries recognised as a "domestic source" as defined by the *US Defence Production Act*.

There are also obvious environmental reasons for limiting supply (the need for energy efficiency and limiting the carbon footprint of production processes, both at the mining and metallurgical stages, greater water efficiency, optimised management of mining tailings, soil rehabilitation, etc.). On the other hand, there is growing opposition to mining projects because of the significant environmental externalities they can cause, but also because of widely divergent political views.

CRITICAL RAW MATERIALS: WHAT IS EUROPEAN UNION'S STRATEGY?

The supply/demand imbalance and, ultimately, the measure of dependence on the resource are expressed by the concept of "criticality", which simultaneously assesses the economic importance of raw materials and the risk of supply disruption, the extent of which depends on a wide range of factors mentioned above. Every three years since 2011, the European Commission has published a [list of "critical substances"](#) for the Member States. The most recent one dates from 2023 and now includes thirty-four resources, with the notable inclusion of copper. In 2015, the European Institute of Technology and Innovation set up a research consortium dedicated to critical raw materials ([EIT Raw Materials](#)). In 2020, it took over the administration of the [European Raw Materials Alliance \(ERMA\)](#) following a logic similar to that of the "battery Airbus".

ERMA aims to reduce Europe's dependence on these critical mineral resources as part of a European action plan defined as one of the conditions for achieving the Green Deal [Critical Raw Materials Act \(CRMA\)](#) launched in March 2023. The internal part of the plan sets precise targets for Member States' production capacity by 2030, with a view to reducing the European Union's strategic dependence.

The national extractive sectors will therefore have to be capable of satisfying 10% of Europe's annual

[6] The concept of mineral resources refers to the quantity of resources identified/measured geologically, while that of mineral reserves quantifies the quantity that can be economically exploited.

[7] High Pressure Acid Leaching

consumption, the processing and refining sectors 40%, and the recycling sectors 65%. In addition, no more than 65% of the European Union's annual consumption of each strategic raw material should come from a single third country, whatever its degree of processing. In addition to these quantified ambitions, a number of provisions have been added, such as the simplification of procedures and administrative delays linked to the opening of a mine, refinery or recycling plant, increased risk monitoring - including the obligation for certain large companies to carry out stress tests to assess the degree of exposure of their own value chain to the risk of supply disruption - and coordination of the management of strategic stocks of [critical metals](#) within the European Union.

The CRMA is also committed to supporting the adoption and deployment of cutting-edge technologies, as well as the training required for the deployment of the various abovementioned industries. Lastly, these measures will go hand in hand with a strengthening of sustainable development criteria, both within the European Union and vis-à-vis third countries, whether in terms of labour law, human rights or environmental protection.

As part of a broader strategy pursued by the [Green Deal Industrial Plan](#), the CRMA should not, however, be seen in isolation, but in its links - ideally intricate - with other flagship measures in Europe, such as the [Net Zero Industry Act \(NZIA\)](#), launched at the same time, or the reform of the electricity market in the context of an energy crisis triggered in the summer of 2021 and greatly exacerbated by the war in Ukraine and the drastic reduction in Russian gas supplies.

It is certainly premature to judge the relevance of the CRMA. While its ambitions make undeniable sense, their operational implementation over the next two or three years will clearly determine its success or failure. A number of observations can nevertheless be made. First of all, its degree of effectiveness must be seen in the context of a long timeframe and a comparative logic that requires us to measure the evolution of the "balance of power" between the United States, the European Union and China in terms of access to these resources. The scale of the funding allocated, the degree of intra-European coherence

and the ability to closely link industrial and energy policies will be decisive variables in this respect. The strong dissonance between Member States on the issue of nuclear power, the exclusion in the NZIA of nuclear power from the list of strategic technologies (with the exception of small modular reactors - SMRs), despite it being classified as low-carbon, or, among other examples, the uncertainties surrounding the "battery regulation", such as the procrastination over the end of the internal combustion engine in 2035, might seem far removed from concerns about securing critical metals. But they are not: sustainable electricity generation, electrification of applications and development of sectors of activity (automotive, batteries, etc.) enable a response to this demand, which constitutes the different facets of a single objective, that of an environmental transition that restores or preserves European industrial capital.

There can be no high-performance industries without a pragmatic, ambitious and coherent energy policy. It would perhaps be a mistake to think that the risk of divergent views might not also affect European strategies to secure supplies. In Europe, mining policy falls within the national sphere, and the resulting coordination effort for the entire value chain is considerable, while the impetus from Brussels is coupled with national measures (such as the launch in France of a private equity investment fund dedicated to critical metals), which must complement each other. Have we forgotten that in the first part of the 20th century, the United Kingdom and the United States were in conflict with one another over the extraction and refining of tin, which was highly strategic at the time because of its military applications[8]?

Secondly, we cannot underestimate the fact that behind the risk of shortages in the medium or long term lies a very different reality, that of the world commodities markets, where prices are governed mainly by the short horizons of the agents (producers, users, traders, speculators).

By way of illustration, if we consider that the primary supply of copper should be largely insufficient in the long term[9] to cover all needs, this was hardly reflected in prices in 2022. After factoring in the

[8] Namely the manufacture of tinplate used for canned food and the lining of motor vehicle fuel tanks. Read Pahl, W. (1943), *La lutte mondiale pour les matières premières*, Paris, Payot.

[9] Seck, G.S., Hache, E., Bonnet C., Simoën M., Carcanague S. (2020), "Copper at the crossroads: Assessment of the interactions between low carbon energy transition and supply limitations", *Resources, Conservation & Recycling*, 163, 105072

shock of the war in Ukraine, they slumped under the weight of Chinese growth, which was heavily penalised by a faltering property sector and Beijing's zero-Covid policy, as well as by the appreciation of the US dollar over much of the year. The commodities markets are undoubtedly 'Janusian', looking to two masters, geopolitics and macroeconomics, and their unpredictable vassal, speculation. The dissonance between the short and long term and, ultimately, the extraordinary instability of commodity prices may be ancient history, but they have very clear operational implications that make it necessary to clarify a number of points with regard to strategies for securing supplies and the CRMA:

1- In commercial and financial terms, it is not so much a question of obtaining these critical resources as of obtaining them at the best price, which is a *sine qua non* for the competitiveness of Europe's green industries. This involves adopting contractual practices (offtake contracts and optionality within commercial contracts) and developing financial strategies to adapt to the instability of raw material prices, which implies strengthening structural mechanisms, allowing European companies to have transparent price references, to hedge the diversity of price risks associated with this instability but also to stabilise, in mining and metallurgy, a national or European shareholding over the long term. A better link between the promotion of green and sustainable finance and the industrial strategies of the energy transition must therefore be established.

2- From a strategic point of view, it would take admirable optimism - or boundless naivety - to imagine that China will not respond to the new ambitions of its European and American competitors. We cannot ignore the fact that, given its market power, China might be able to influence the price of several critical minerals and metals. If their increase is likely to penalise Western buyers, their decrease - temporary and artificial - could just as easily undermine the business models of American or European mining and recycling activities. The increase in the resilience of European industries sought by ERMA must take this dimension into account, and the development of a

trading entity acting on behalf of the Member States would certainly be a solution worth considering. It could be a useful complement to any strategic reserves, the cost of which to the State and the ability to obtain supplies at the best price will have to be assessed.

Thirdly, in terms of trade policies and diplomacy, the CRMA still seems vague about the international agreements that the European Union wishes to develop and the means that it could use to achieve this, while the United States makes no secret of its ambitions or its pragmatism in this area. On the external front, there is mention of a critical metals *club* bringing together countries that produce and use these resources, but it is not clear what Europe's strategy will be in this area.

The history of the twentieth century is full of initiatives known as "*critical raw materials agreements*", often with mixed success. In this sense, it is absolutely necessary to establish a diplomatic approach to raw materials, which must be much broader in scope than just mineral resources. While Europe's agricultural power may be less apparent on international markets, it remains a key element in the implementation of partnership strategies with certain countries that export critical metals. From a historical perspective that is now wrongly played down, and in line with what has already been said, it is worth remembering that the replenishment of US strategic tin stockpiles in the 1950s took place in a context of low prices (raising the question of whether the European approach to strategic stocks is the right one) and through the intermediary of an international trader, Philipp Brothers (Phibro), whose mission, in the context of the Korean War and under the *Agricultural Trade Development and Assistance Act* enacted in 1954, was to trade American agricultural products for tin under compensation agreements^[10].

Finally, from a societal point of view, it seems clear that the development of mining, metallurgy and recycling activities will be hampered if national and local populations are not better involved, in an already tense political and social context. A great deal of educational work therefore needs to be done in this

[10] Waskis, H. (1992), Philipp Brothers, the rise and Fall of a Trading Giant 1901-1990, Melksham: Metal Bulletin BBooks.

area to bring everyone's environmental aspirations into line with the needs they imply in terms of mineral resources. These will also have to be used to support the huge training effort required to ensure that the sustainable extractive and metallurgical industries - which the European Union should be promoting - have all the knowledge and skills they need. However, CRMA does not offer enough concrete prospects in this area.

The problem of securing supplies is an old one: as early as the middle of the 19th century, England was concerned that the depletion of its coal mines would threaten its industrial supremacy^[11]. This is occurring again on a grand scale, and the European Union has resolutely committed itself to the race for critical mineral resources, a prerequisite for its environmental transition and for a sovereign, sustainable industry.

The road ahead is nonetheless winding and rocky, and the Member States must take the measure of this instability that is consubstantial with the reality of global raw materials markets.

The effort to make Europe more secure, made necessary by the strengthening of its strategic autonomy, cannot be achieved at the expense of a multilateralism that is admittedly ailing but which, despite its excesses and the failure to take sufficient account of the aspirations of developing populations and countries, was promoted for its peace-making virtues in the aftermath of the Second World War.

Built on the European Coal and Steel Community (ECSC), Europe, legitimately concerned about defending its industrial capital in the face of competition from China but also from the United States and its *Inflation Reduction Act* (IRA), must relentlessly promote trade of this kind where globalisation and the promotion of social and environmental standards are not mutually exclusive. Global harmony is certainly at stake at a time when a worrying trend is resonating more and more - that of the "war economy".

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^[11] Jevons, W.S. (1865),
The Coal Question, Londres:
MacMillan and Co.

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