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China - Africa: the control on raw materials and the impact on the world economy

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ABSTRACT

This thesis aims to study the relationship between China and Africa, focusing on the interest shown by China in African commodities, and the consequences this has on Companies worldwide.

We start analyzing the two main problems that contributed to modify today's global geo-political structure.

First, the scarcity of raw material in the world, a problem that has been affecting almost all sectors for months, from food and beverage to automotive, paper, energy and oil. The reasons behind this phenomenon are various. Beside pandemic and the disruptions in global supply chains, the conflict between Russia and Ukraine contributed to complicating the situation. According to the data, steel is by far the raw material which both cost and supply problems are most perceived. Excluding energy, between other most critical natural resources emerge cotton, coal, nickel, zinc and iron ore among metals, urea and ammonium phosphate among fertilizers, corn, soybean oil, wheat and palm oil among agricultural products (*The Procurement, 2022*).

Another of the main causes of raw material shortage in the world is the restart of the economy, which occurred in a non-linear way. While commodities are drastically decreasing, consumption and the consequent need to produce don't stop growing. This is also because the global middle class is considerably increasing. By 2030 the global consumer class is expected to reach 4.8 billion people, that is 1.3 billion more people with increased purchasing power than today. This will shape a new global production system (*Matchplat, 2023; European Commission, 2023)*.

One of the Countries more committed to make the consumer class growing is China. Its goal is to propel the nation's economic recovery through the *policy push*, a strategic plan for expanding domestic demand (2022-2035). In the last year, especially after three years of COVID-19 disruptions, the central leadership has identified insufficient domestic demand as an acute challenge facing the nation's economic and social development. President Xi Jinping has emphasized the importance of expanding the Country's consumption demand supported by stable income growth, for this reason China is working on deepening reforms to boost household incomes and bridge the wealth gap between urban and rural residents. The

Chinese President urged the Country to better coordinate the expansion of domestic demand and supply-side structural reform to enhance the strength and reliability of domestic economic circulation, increase its driving force and vitality, and boost its interaction with the international markets. Xi also called on policymakers to form a complete domestic demand system as soon as possible, and improve a long-term mechanism for expanding residents' consumption, so that residents are willing to consume due to the excellent consumption environment and strong sense of gain. China's prosperity, with its 1.4 billion consumers, affects the fates of domestic and foreign businesses and the prospects of global economic growth. According to the experts, the further expansion of China's consumer market will help promote the Country's greater integration with global markets and bring changes in international trade as upgraded demand of Chinese consumers will mean more imports (*Shijiazhuang Municipal People's Government, 2023)*.

The excessive lifestyles of the world's more affluent societies are primarily to blame for the fact that supplies of some natural resources are gradually being used up. An example may be indium (a material needed to produce flat screens): the Clausthal Institute of Environmental Technology (CUTEC) recently calculated the static lifetime (the remaining length of time that commodities are expected to be available to us) of indium reserves to be a mere 13 years, and this is a real risk. On the surface, the situation appears to be much the same for copper, an essential component for the main modern electronics, that according to the CUTEC will have been used up in 39 years' time. Nonetheless, copper has not been added to the list of critical raw materials, as there are very good recycling systems in place for this natural resource and the current global recycling rate of 20% is likely to rise considerably in the future (*Remondis*).

The second problem is the price tensions, a direct consequence of the situation just analyzed, the limited availability of those commodities on which our economy depends today. Until recently, consumers could rely on a steady rate of inflation, stable pricing and an ability to order products without having to think about lead times or the vast network of services that allow them to arrive on their doorstep in good time. Businesses also enjoyed a relatively predictable market, with commodities that were both affordable and readily available. But that's now changed (*Achilles*). The causes of price tensions are more or less

the same as the causes of raw materials shortage: misalignment between supply and demand, political events which had an impact on international trade, energy prices increase.

The global business climate is increasingly uncertain, and manufacturers are facing a myriad of challenges, including high energy prices and unexpected fluctuations in commodities costs. These are ultimately influenced by supply and demand, as well as the costs involved in procuring some natural resources. Their availability can be impacted by various factors, and whenever demand outstrips supply, prices will rise. Similarly, if energy prices go up, the cost of the production, transportation and extraction will rise, which, in turn, will affect material market prices.

Over the past few years, the following key events contributed to high raw material prices and will potentially continue to do so in the future: the Covid-19 pandemic - due to lockdown restrictions, production and transportation of commodities was completely stopped, and this reflected into supply reduction and demand rise -, Russia-Ukraine war – the conflict deeply affected the traceability of several natural resources usually exported from the Countries involved, leading to a surge in prices in early 2022 -, political and trade tensions – mainly between China and the United States, resulted in the imposition of increased tariffs and the interruption of several supply chains -, logistical disruptions - drastic increase of the containers price -. The industries more affected by these changes are food and beverage, packaging, automotive and, moreover, energy (*Tracc, 2023*).

Since manufacturing raw materials requires the use of energy, it's easy to understand how fluctuations in power supply industry, due to the conflict in East Europe and Russia unilateral decision to suspend deliveries of gas to some EU member states in 2022, affected any other field, where oil, coal and gas prices have all reached historic heights in nominal terms (*Tracc, 2023; European Council, 2023*).

Despite both commodities and energy prices have recently dropped, in the upcoming years, they will remain a great challenge for the manufacturers. According to the World Bank's April 2023 *Commodity Markets Outlook*, price surges following Russia's invasion of Ukraine have largely reversed due to slowing global economic activity, favorable winter weather and redirected commodity trade. Energy prices have also dropped recently, with the brent oil price of March 2023 being 35% lower than its record pick of June 2022 and the gas prices dropping by about 80% from their August peak. While this is the steepest decline in prices since the pandemic, raw material costs will remain a huge problem, as current

prices declines are not significant enough to absorb the impact of the past few years' increases.

As mentioned above, to reverse the trend of rising prices, several Countries reduced their international trade activity to save money on the logistic. The increase in container's price is mainly due to the inflation. Data from Truckstop.com and FTR Transportation Intelligence showed an 18.3% rise in truck freight costs since January 2022, the largest 12-month increase on record. In addition, the prices of support services and warehousing have also soared. There are several reasons behind this increase: first of all labor shortages, a consequence of Pandemic, the increase of driver wages as well as trucks cost (both increased 50% from 2021 to 2022) and fuel price (*Dupré Logistics, 2022*).

The events occurred in the last years have forced each Country to rely on its own resources. Since commodities are localized in certain areas, some nations are trying to prevent any future crisis that may derive from shortage of raw materials by making investments abroad. This is the case of China, which is investing a lot in Africa by building infrastructures of any kind.

Compared to other Countries, China has a different approach: while UK, France and the US are concentrated in financial services and extractives (*Calabrese, 2019*), Chinese FDIs in productive sectors (mainly manufacturing) tend to contribute to increase economic growth. To achieve this goal, China had to invest heavily in the construction of digital, energy, transport infrastructures and industrial parks, and this has driven to a healthy competition, with the local firms striving to provide higher quality products to compete with the Chinese firms *(Darko et al., 2018).* Chinese investments are, on average, predominantly market-seeking, rather than export-oriented *(Kaplinsky et al., 2007)*. African Countries are not seen by Chinese investors as low-cost destinations to produce for third markets, but rather as viable markets in their own right.

Nonetheless, someone argues that Chinese imports and investments have a destructive impact on African manufacturing and agriculture. Chinese firms are often accused of deforestation, extracting minerals and raising social and economic challenges (due to the fact that some resources are located in conflict areas) (*Farooki and Kaplinsky, 2011; Human Rights Watch, 2011; Moyo, 2012*). Investment by Chinese oil companies, which is playing an increasing role in the African oil sector, has been referred to as *China's oil*

diplomacy (*Power et al., 2012*). According to some studies, this initiative has two main goals: in the short-term, secure oil supplies to help feed growing domestic demand back in China; and in the long-term, position China as a global player in the international oil market (*Ian Taylor, "Unpacking China's Resource Diplomacy in Africa; Linda Calabrese & Xiaoyang Tang, 2020*).

It is clear that Chinese investments in Africa have their pros and cons. Though the evident positive outcomes on the African economy (the PIL of some Country is considerably increasing) China-Africa trade relations are unbalanced in terms of volumes, composition and origin. The amount of goods imported from China is far greater than those exported from Africa, the variety of goods is also incomparable *(Qobo and le Pere, 2018)*.

Chinese investments have a great impact on African economy, and, as a consequence, on the economy of those nations which are also investing in Africa. In the near future, this may greatly affect the world asset. Actually, up to date a lot of Countries exploited Africa as supplier of raw materials, while the factories to process them are located somewhere else in the world; if, due to China investments in commodities processing infrastructures, Africa turns into a nation able to process natural resources by itself, the world economy may drastically change, with Chinese hegemony over most of the world's minerals, processed by its own infrastructures in Africa, and the shutdown of several factories all around the world currently used in the processing of the raw materials extracted in Africa. Of course, this will have a great impact on both commodities and final goods price, with the natural resources processed in the Country where they are extracted (with probably reduced labor costs) and the final goods exported directly from the same place.

When it comes to raw material costs, the only constant is change. The global business climate will remain uncertain for the foreseeable future, and companies that are able to adapt to and thrive in uncertainty are the ones that will survive. If the hypothesized scenario comes true, all existing entrepreneurial systems would be undermined, and the value chain between different nations and operators may undergo a big change. The same dynamic occurred in the past with the end of colonialism, the great challenge will be to find a new equilibrium.

INTRODUCTION

本文旨在研究中国和非洲的关系，重点关注中国对非洲原材料的兴趣及其对全球企业的影响。在过去的几年里，因为新冠病毒及俄乌战争，原材料价格过高，给大大小小的几家公司带来了压力。**为什么原材料价格突然上涨**？**为什么原料特别重要**？

并非所有国家都有丰富的原料。拥有大量原材料（尤其罕见）的国家是中国、俄罗斯、美国、巴西、南菲。没有原料的国家就进口它们，以在自己国家进加工它们。所以，在疫情和东欧竞争期间中，商品价格上涨的原因是无法将原材料从一个国家转移到另一个国家。并且，在疫情期间物流成本也变得疯狂：因为出口商品的风险、卫生控制、货柜不可用，经常物流成本比产品成本贵。鉴于情况，每个国家都开始了**去全球化**的过程，意思是他们开始变得更加自给自足。国家开始开发使他们能够回收原材料的技术、寻找通常从其他国家进口原料的替代品、调整其产品和活动以适应国家或大陆的可用资源。他们开始减少对他国的依赖。不幸的是，有时无法完全依靠自己的资源，因此各国必须与原材料丰富的国家签署有利的**供应协议**。**非洲**是原材料丰富地方之一。

非洲之所以在经济大国眼中如此有吸引力，是因为关键原材料的大量存在。当原材料在市场上的需求很高，但不容易获得时，将其定义为“关键”。原料可能很难回收的原因是提取很困难，还是它们正在耗尽。当然，材料越稀有，价格就越高。一些欧洲和美洲国家已经在非洲存在了好久时间。多年来，它们开发非洲土地和劳动力，以提取其企业所需的自然资源；然后将它们出口到自己国家进行加工，并在市场上销售最终产品。**中国态度**不同：北京没有开发非洲土地和劳动力，而是决定投资和建设原材料提取和加工所需的基础设施。这对非洲有利也有弊。中国在非洲存在带来的**好处**是：

一）在非洲**外国直接投资**的增加；

二）创造**新的工作岗位**，从而降低失业率；

三）非洲开始了一种**工业化**过程。

虽然由此矿工们仍然不得不面对不安全工作条件，但是中国在非洲的存在对好多非洲人的生活条件产生了重大影响。

可惜，还有一些**缺点**：

一）非洲**债务**。中国在非洲投资超过三千亿美元，现在要求归还。因为许多非洲国家不能偿清债务，有时北京利用这一弱点对他有利，减少金额以换取经济利益。

二）**中国军事存在**增加，特别是在非洲海岸上。由于美国军事基地的存在，这是一个战略地位。

三）**中国劳动力出口**。在起步阶段，中国向非洲出口自己的劳动力，教当地人如何教工原材料。其实，如果新基础设施对非洲人创造新的岗位，但是管理职位总是由中国人担任。

与欧洲和美国等其他国家相比，中国的优势之一是两个国家之间的**政治亲和力**，这也是因为它们都没有殖民者的历史。另外，因为中国是第一承认非洲一些地区独立的国家，所以得到了它们的信任。然而，在许多情况下北京利用与一些非洲国家的良好关系及其软弱政府，腐败了体系并获得了多好处。这导致中国几乎完全控制一些非常关键的原料。例如，这种情况发生在富含钴和锂的**刚果民主共和国**、富含锂矿的**赞比亚**和**纳米比亚**、富含钢铁的**津巴布韦**。在这些国家，中国与一些当地公司董事达成协议，目的是减少纳税或者逃避对提取和出口材料数量的控制。

还有一个因素强调中非关系的发展，也就是两个国家之间的**交易活动**。1999 年，中国对非洲贸易额为六十亿美元，今天贸易额为一千八百亿美元，主要由加工和未加工原材料组成。中国主要进口的原材料是**原油、铜、铝土矿、铀、铝、锰和铁矿石**。虽然中国与非洲的关系非常强，非洲国家明白它们完全与一个国家合作没有任何优势。它们知道美国、欧洲与澳大利亚也对它原材料感兴趣，所以正在利用这种利益来增加竞争，并能够讨论更有利的条件。

现在我们来分析**为什么原材料如此重要**。

除了日常用品的生产，世界对原材料（尤其是位于非洲的）感兴趣的主要驱动因素之一是**向可再生能源过度**。许多国家承诺在 2050 年内实现零排放。向低排放与数字化未来过度需要可再生能源与数字技术关键原材料的可持续供应。电池、电动机与风力涡轮机将帮助社会满足其能源需求，同时将限制气体排放；同样，印刷电路板也是数字化未来所必需的。因此，重要的是了解那些原材料对未来发展至关重要、它们来自哪里、哪些是更关键的并可能面对中断供应的风险、如何负责任地提取和处理原材料。

用于创造新技术的一些关键原材料预计将在未来几十年内用完。为了面对这种情况，没各国家都在寻找目前使用材料的有价值替代品。例如，欧洲正在努力促进关键原材料的自给自足。因此，2023 年 3 月欧盟**“关键原材料法”**与“净零工业发”一起公布。“关键原材料法”含八十七种关键原材料的清单，它旨在实现以下目标：

- 加强欧洲关键原材料价值链的每个阶段；
- 使欧盟进口多样化，减少战略依赖；
- 提高欧盟控制关键原材料供应中断风险的能力；
- 提高循环性与可持续性。

有关**企业**，原材料价格上涨对全球企业产生了沉重影响。其中一些公司能够吸收成本，以避免将其传递给客户，另一些公司则被迫提高价格，为这些公司的销售额大幅下降，因此遭受的损失比较大。考虑到欧洲、美国和亚洲公司可以区分三种不同对原材料价格上涨的态度：在欧洲许多公司试图吸收原材料的成本；在美国价格与生产成本同时上涨；在亚洲产品价格（尤其是电动汽车的）还不稳定，政府设立窗口，如春节，来促进某些产品的销售。

总之，原材料成本增加和中非关系发展对全球企业产生了深远的影响。原材料成本增加紧张了利润率，并且迫使公司寻找减轻影响的方法。中国与非洲关系对原材料价格、可用性和可及性动态的压力很大，给在这些地区经营的企业带来了很多挑战和机会。对公司来说，至关重要的是采取促进负责任采购的战略、可持续的做法与公平的伙伴关系，以应对全球原材料市场的复杂性，并确保长期成功。中国在非洲的存在开始了非洲大陆的转型过程，这将导致未来的进一步变化。它们会是什么，并其他国家会如何反应，还有待观察。

Chapter 1

COMMODITIES

1.1 SOCIAL IMPORTANCE OF THE CRITICAL RAW MATERIALS

Raw materials refer to materials or substances utilized in the initial production or creation of goods. These materials are traded on various commodities exchanges globally. Companies engage in the trade of raw materials in the factory market as they are crucial elements in the production process.

The economic value of raw materials is determined by weighing their significance against the potential risks associated with their supply, as depicted in Figure 1. The supply risk, which reflects the difficulties in acquiring the necessary material, can vary according to the perspective of different countries. In nations that possess ample quantities of a specific material, the supply risk is commonly lower compared to other countries, resulting in a lower value being assigned to that particular material. Conversely, when a material holds both high economic importance and is faced with significant supply risk, it is classified as a critical raw material (CRM), emphasizing its critical role in supporting the country's economy (Figure 2). The replacement of a material with another one can alter the supply risk and significance of that resource, leading to a shift in the list of critical raw materials. Such changes can impact the prices of both commodities and the final products (RM Academy).

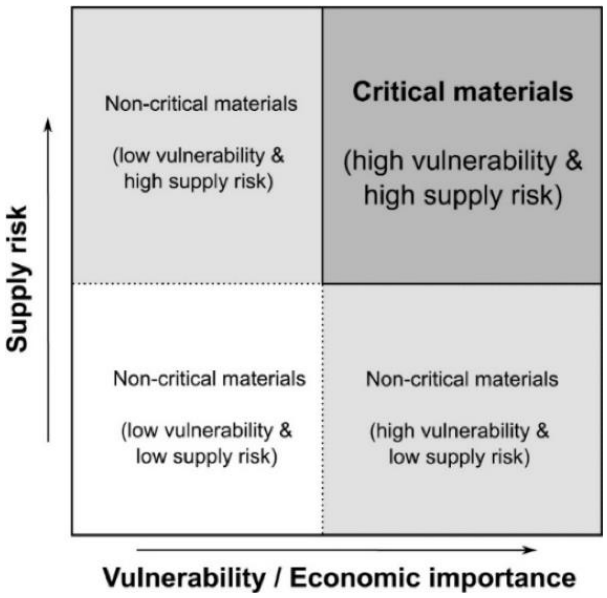

Figure 1. How critical raw materials are determined (Source: RM Academy).

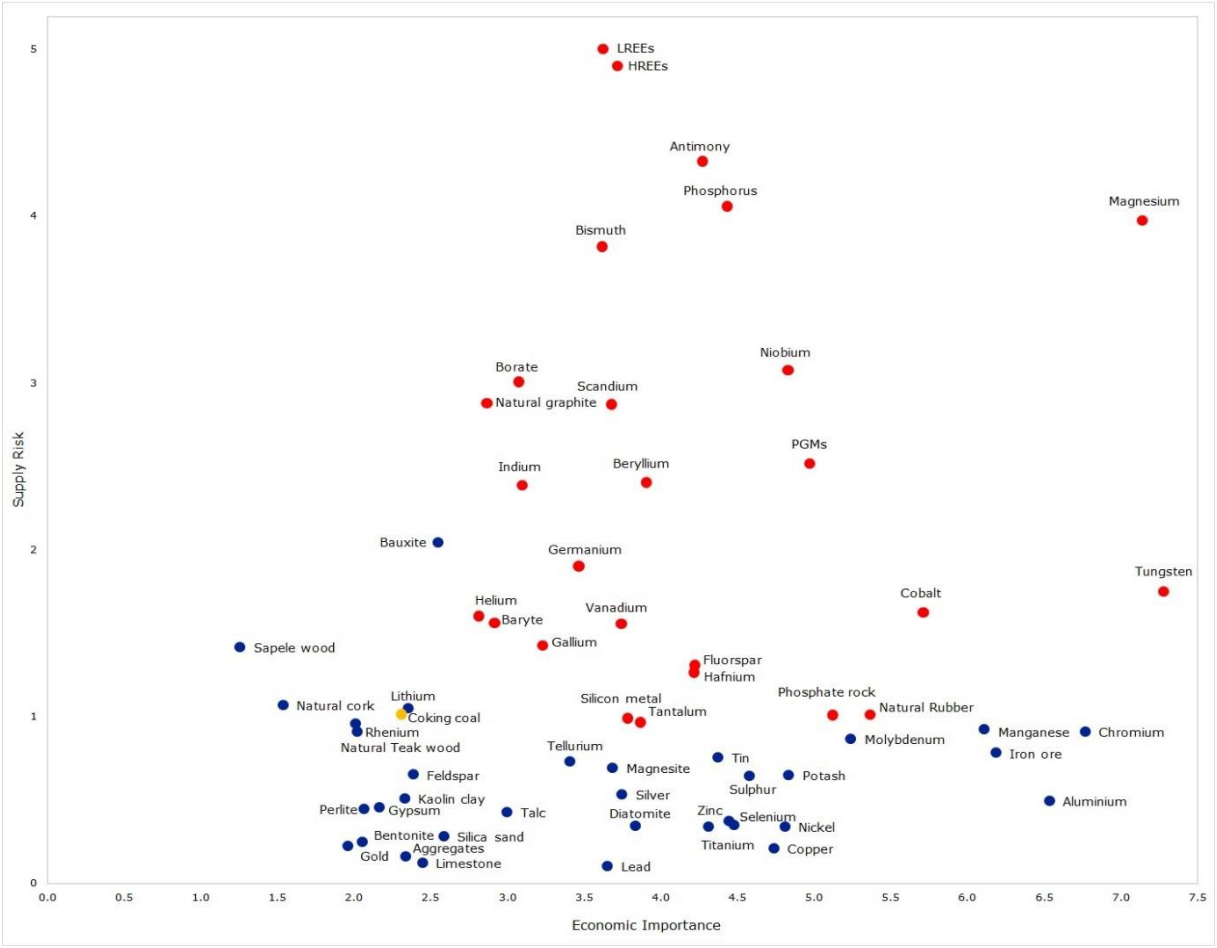

Figure 2. European ranking of raw materials. Critical raw materials in red (Source: RM Academy).

The use of Critical Raw Materials (CRMs) is essential in various industrial contexts and emerging technologies, which have become more complex and resource-intensive over time. As demand for these materials continues to rise, there is a pressing need to explore new sources within the Earth's crust. Advancements in technology and the improvement of overall quality of life are heavily reliant on a diverse range of commodities. For example, a smartphone can contain up to 50 different metals, each offering specific properties such as lightweight construction and compactness. The availability of CRMs also plays a significant role in addressing climate change, as renewable energy sources like solar panels, wind turbines, and electric vehicles largely depend on these scarce materials.

There are various factors that play a crucial role in determining the criticality of a particular material. These factors may include geological, environmental, economic, or socio-political considerations. One of the main factors that contributes to the risk of supply of a material is its **unequal distribution**, which is often influenced by geopolitical boundaries.

This can create situations where certain countries or regions have monopolies or limited access to the material. The uneven distribution of resources globally can also potentially result in shortages, creating a complex relationship between different nations. In today's world, the availability of raw materials holds significant influence in shaping the economic and geopolitical landscape. For example, the European Union, which lacks abundant natural resources, must rely on importing ores from other countries and processing them within its own industries. The emergence of new and developing markets, such as China, India, and South Africa, has further intensified competition for these critical materials.

In addition to factors such as **scarcity** and **lack of viable substitutes**, it is also important to consider the potential dangers and environmental impact of mineral **extraction**. Careful planning and strict monitoring can help prevent or reduce pollution, loss of biodiversity, and negative effects on local communities. In addition to environmental concerns, social and political issues must also be taken into account. Regions with lax regulations on extraction may create situations where workers are exploited by both state and non-state actors. Human rights violations, child labor, and unsafe working conditions are common in areas where job opportunities are limited. Illegitimate mining practices can also harm indigenous communities and their surroundings. For example, in the Republic of Congo, minerals are often extracted illegally to produce components used in popular electronic devices.

1.2 WHERE ARE CRMs LOCATED

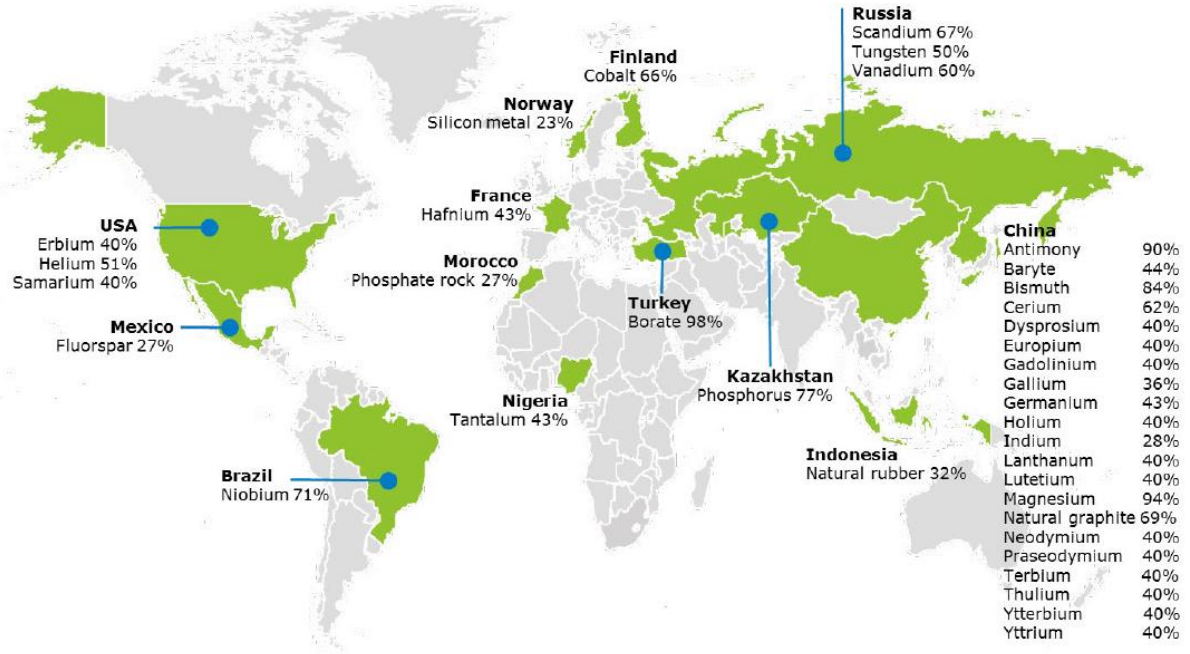

Figure 3. Contribution of primary global suppliers of critical raw materials (Source: Gislev and Grohol, 2018).

A thorough examination of the map highlights **China's** dominant role as the primary producer of crucial raw materials like rare earth elements, magnesium, tungsten, antimony, gallium, and germanium. While other countries also contribute significantly in specific raw material production, such as **Brazil's** involvement in niobium, the **United States'** lead in beryllium and helium, and **Russia** and **South Africa's** focus on platinum group metals (palladium, iridium, platinum, rhodium, and ruthenium). Within the European Union (EU), there are a number of vital raw materials that lack a significant presence in the upstream value chain. These materials include antimony, beryllium, borates, magnesium, niobium, platinum group metals, phosphorus, rare earths, scandium, tantalum, and vanadium. This scarcity can be attributed to a variety of reasons, such as the absence of these materials in European soil or economic and social barriers that make exploration and extraction difficult, such as reluctance to open new mines. It should also be noted that the cultivation of natural rubber is entirely reliant on sources outside of the EU. The only exception is hafnium, in which France is the primary global producer among EU Member States. Furthermore, for hafnium and indium, EU Member States are able to produce enough primary materials, reducing the need for significant imports from outside of Europe (Gislev and Grohol, 2018).

1.3 COMMODITY PRICES: CRUDE OIL, AGRICULTURAL COMMODITIES, METAL AND MINERALS

Beside their availability on the market, other factors have an impact on the commodity prices. In the years of Covid-19, the prices of the main raw materials reached their peak; the increase compared to the pre-pandemic period was between 150 and 300%. The conflict in East Europe had a limited effect on commodity prices, influenced by a combination of a deceleration in global economic activity, favorable winter weather, and the rerouting of key commodity exports from Russia and Ukraine. At the beginning of last year already, significant declines in the prices of wheat and natural gas have been observed. However, despite these drops, prices for major commodities, overall, still stand above their average levels (World Bank Group, 2023).

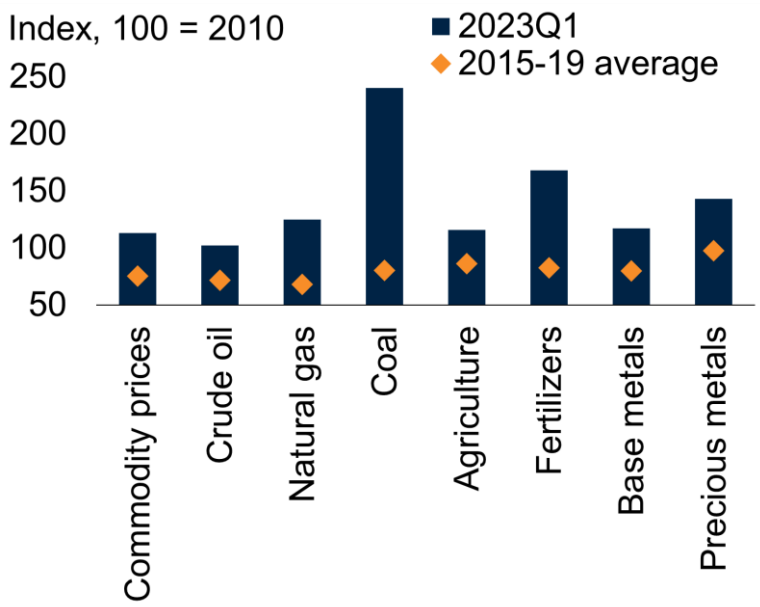

Figure 4. Commodity prices indexes (Source: World Bank).

Unfortunately, risks to the forecasted trend of commodity prices don't stop increasing, and the causes are evident.

Weaker-than-expected oil supply. The supply of oil from Russia, along with other member countries of the Organization of Petroleum Exporting Countries and its affiliates (OPEC+), remains below the set targets. This deficiency, coupled with potential reluctance

from oil and coal companies to increase supply elsewhere or diversify into non-fossil fuel ventures, adds pressure to the market.

Direction of demand from China. The recovery in China might be centered on commodity-intensive sectors, potentially leading to heightened prices for energy and metals due to increased demand from the industrial sector. A lot depends on how the real estate sector in China goes in the next months, as it could further drive-up prices for aluminum, copper, lithium, and nickel, crucial components in electric vehicle battery manufacturing.

Intensification of geopolitical tensions. Unexpected shifts in global supplies of grain and energy, particularly coal and natural gas, could occur if geopolitical tensions escalate. European gas stocks may prove insufficient for the upcoming winter months, and disruptions in trade routes amid sanctions could elevate grain prices (European Commission, 2023).

Unfavorable weather conditions. Adverse weather events impacting major global food-producing regions could contribute to a surge in food prices. Colder-than-usual winter weather or warmer-than-usual summer conditions may increase heating or cooling demand for energy in the northern hemisphere (IPCC 2023; World Bank, 2020).

One potential risk to consider is the possibility of lower global economic growth than anticipated (World Bank Group, 2023, p. 5). If inflationary pressures continue, major central banks may respond with strong measures to curb it. This could include tightening credit conditions, which could ultimately decrease demand for industrial commodities and lead to

							Percent change from previous year		Differences in levels from October 2022 projections	
Commodity	Unit	2020	2021	2022	2023f	2024f	2023f	2024f	2023f	2024f
Price in nominal U.S. dollars										
Energy										
Coal, Australia	$/mt	60.8	138.1	344.9	200.0	155.0	-42.0	-22.5	-40.0	-57.3
Crude oil, Brent	$/bbl	42.3	70.4	99.8	84.0	86.0	-15.9	2.4	-8.0	6.0
Natural gas, Europe	$/mmbtu	3.2	16.1	40.3	19.0	17.0	-52.9	-10.5	-13.0	-11.0
Natural gas, U.S.	$/mmbtu	2.0	3.9	6.4	2.7	3.7	-57.6	37.0	-3.5	-2.3
Liquefied natural gas, Japan	$/mmbtu	8.3	10.8	18.4	18.0	16.0	-2.3	-11.1	1.0	0.1
Non-Energy Commodities										
Agriculture										
Beverages										
Cocoa	$/kg	2.37	2.43	2.39	2.70	2.55	12.8	-5.6	0.40	0.21
Coffee, Arabica	$/kg	3.32	4.51	5.63	4.80	4.60	-14.7	-4.2	-0.70	-0.81
Coffee, Robusta	$/kg	1.52	1.98	2.29	2.30	2.25	0.7	-2.2	0.20	0.14
Tea, average	$/kg	2.70	2.69	3.05	2.70	2.75	-11.5	1.9	-0.10	-0.07
Food										
Grains										
Barley	$/mt	98	...	...	210	190	...	-9.5	35	18
Maize	$/mt	165	260	319	270	240	-15.3	-11.1	-20	-47
Rice, Thailand, 5%	$/mt	497	458	437	510	490	16.8	-3.9	75	54
Wheat, U.S., HRW	$/mt	232	315	430	355	335	-17.4	-5.6	-55	-70

Raw Materials										
Timber										
Logs, Africa	$/cum	399	414	369	380	390	3.0	2.6	-10	-5
Logs, S.E. Asia	$/cum	279	271	228	230	235	0.9	2.2	-20	-19
Sawnwood, S.E. Asia	$/cum	700	750	675	680	689	0.8	1.4	-45	-46
Other Raw Materials										
Cotton	$/kg	1.59	2.23	2.86	2.20	2.25	-23.2	2.3	-0.70	-0.61
Rubber, TSR20	$/kg	1.33	1.68	1.54	1.40	1.50	-9.3	7.1	-0.50	-0.44
Tobacco	$/mt	4,336	4,155	4,270	4,100	4,120	-4.0	0.5	0	4
Metals and Minerals										
Aluminum	$/mt	1,704	2,473	2,705	2,400	2,450	-11.3	2.1	0	16
Copper	$/mt	6,174	9,317	8,822	8,500	8,000	-3.7	-5.9	1200	639
Iron ore	$/dmt	108.9	161.7	121.3	115.0	110.0	-5.2	-4.3	15	12
Lead	$/mt	1,825	2,200	2,151	2,100	2,000	-2.4	-4.8	200	83
Nickel	$/mt	13,787	18,465	25,834	22,000	20,000	-14.8	-9.1	1000	-708
Tin	$/mt	17,125	32,384	31,335	24,000	24,500	-23.4	2.1	2000	2243
Zinc	$/mt	2,266	3,003	3,481	2,800	2,700	-19.6	-3.6	0	-71
Precious Metals										
Gold	$/toz	1,770	1,800	1,801	1,900	1,750	5.5	-7.9	200	100
Silver	$/toz	20.5	25.2	21.8	23.0	22.0	5.5	-4.3	2.0	1.0
Platinum	$/toz	883	1,091	962	1,000	1,050	4.0	5.0	0	0

Figure 5. World Bank Commodity Price Forecasts (Source: World Bank).

1.3.1 CRUDE OIL

Despite a decline in crude oil prices during the first quarter of 2023, there was a subsequent increase in early April following a surprising announcement of a production cut by OPEC+. The spot price of Urals, the Russian benchmark, is estimated to have averaged $47 per barrel in early February, that is far below the G7 price cap. The cost of oil exported from Russia varies significantly based on the exit port, transportation method, and associated costs. Some countries reportedly secured substantial discounts on their imports of Russian oil, although spot price data for Urals has become less reliable.

Oil demand was substantially impacted by the reopening of China following the COVID-19 pandemic, as the nation ranks as the second-highest consumer of oil worldwide. This recovery was further reinforced by the resurgence of travel, particularly in air travel, with a 34% increase in international passenger flights within one year. The global interest rates observed a surge due to China's reopening (World Bank Group, 2023, p. 9).

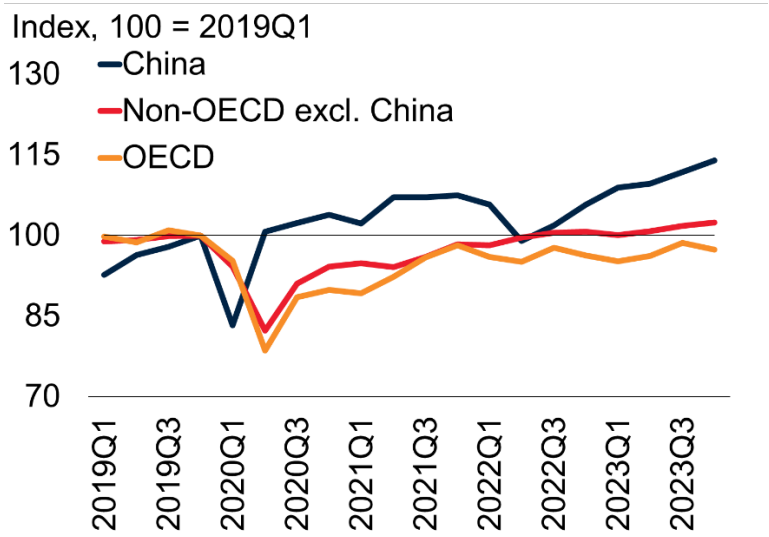

Figure 6. Oil demand (Source: IEA).

In Europe, a combination of the United States' monetary policy rates and the ongoing conflict between Russia and Ukraine has contributed to a slowdown in both industrial activity and oil demand. In February 2023, the EU and G7 collaborated to set a price cap on Russia's oil product exports, ranging from $60 to $100 per barrel depending on the country. This measure aims to maintain the flow of Russian oil while reducing their revenues. Despite the conflict, Russian oil production and exports have not significantly decreased, thanks to increased sales in other regions, particularly Asia. However, there has been a substantial decline in oil exports to the EU and other G7 nations.

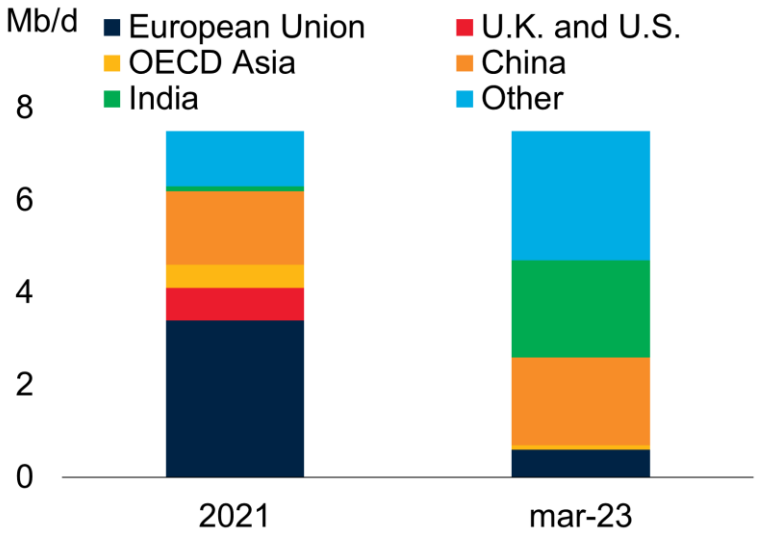

Figure 7. Oil exports from Russia, by destination country/region (Source: IEA 2023 *Oil Market Report*).

In response to the price cap restrictions, Russia has allegedly utilized a "shadow fleet" - a fleet of vessels operating outside of traditional maritime channels and taking unconventional or non-traditional routes to transport oil. These routes may deviate from standard shipping lanes, making it difficult to track the movement of the oil. This allows Russia to sell the oil and products at higher prices to third parties not involved in the agreement. However, this method of trade diversion has its downsides, including less efficient oil transport due to longer journey times and higher transportation costs. There is also an increased risk of oil spills with the use of older vessels on these diverted routes, posing potential environmental and safety hazards.

Despite maintaining a steady level of oil production and export, Russia has experienced a significant decrease in the price they receive for their oil compared to the price of Brent crude oil. From 2022 to 2023, their oil revenues decreased by -48%, with export revenues falling by 36%. These obstacles in exporting crude oil have resulted in a production decrease of 0.5 million barrels per day from March 2023 onwards.

Since the beginning of 2023, the largest shortfalls outside of Russia is in Angola and Nigeria (0.4 mb/d thousand barrels per day and 0.5 mb/d, respectively). Russia is not the only country who cut the production of crude oil, also OPEC+ announced a surprise cut of 1.16 mb/d to start in May and last until the end of 2023.

In the first quarter of 2023, there was little change in production among non-OPEC+ nations. The **United States** experienced a decrease in the number of drilled but uncompleted wells, posing a challenge for companies that may need to scale back their production. This issue is compounded by the limited availability of oilfield services, which has hindered the completion of these wells. Despite this, there was a slight uptick in overall production, although the rig count has decreased slightly due to falling prices.

Although some key oil-producing nations may have faced challenges in maintaining production, there has been a notable rise in crude oil production in Guyana. This surge can be attributed to the start of drilling in its initial oilfields, resulting in a production of 0.4 million barrels per day in the first quarter of 2023. This marks a significant increase of 0.3 million barrels per day compared to the previous year.

What the future holds for us is somewhat uncertain, and this is evident in the fluctuating trend of Brent crude oil prices. It is predicted that the revival of travel-related

industries will boost the demand for gasoline and jet fuel (IEA 2023c). Estimates also indicate a 2 percent growth in oil consumption in 2024, with more than half of this increase attributed to China's recovery. While a rebound in China's economy is expected to drive demand growth in 2023-24, the pace of supply is projected to be slower than before the pandemic, resulting in a slight uptick in prices. However, in regions outside of Asia, the growth in oil demand is anticipated to stabilize in 2024 due to stagnating industrial activity and a continued shift towards a more eco-friendly economy.

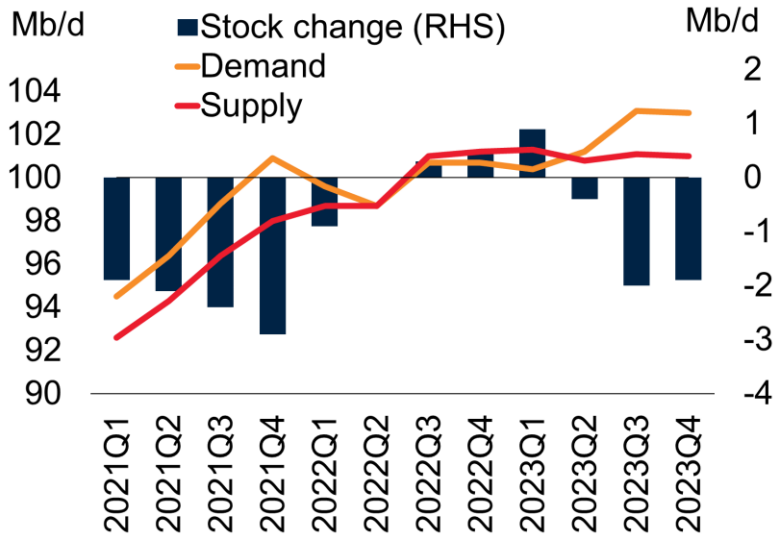

Figure 8. Changes in oil demand, supply, and inventory (Source: IEA).

The increase in global oil production in 2023 was primarily driven by a significant expansion in US production by 1 million barrels per day. Smaller contributions also came from Brazil (0.3 mb/d), Guyana (0.2 mb/d), Canada (0.1 mb/d), and Norway (0.1 mb/d). The production levels of the OPEC+ countries (excluding Russia) are expected to remain steady. However, Russia's production is estimated to have declined between 0.4 mb/d and 0.8 mb/d in 2023 according to various sources (OPEC 2023).

There are two main potential risks to this forecast regarding oil prices. The first is the **speed and strength of China's reopening**, which could have a significant impact on demand. The second is if there is **lower-than-anticipated growth in oil production**, specifically in the United States and among OPEC nations. The only scenario in which prices could decrease is if Russia, against expectations, is able to bolster its oil exports, disrupting global growth.

The potential effect of China's resumption of business activities on the demand for oil depends on how its economy recovers and performs. The predicted 5% growth for China in 2023, combined with a revival in local spending, specifically for gasoline and jet fuel, is likely to have a substantial impact on the rise in oil consumption and prices.

As production plays a crucial role, there are certain factors that may result in production levels being lower than initially projected. The rate of decline in established, mature fields stands at approximately 9% annually, and significant investments are required just to sustain current production levels, presenting potential obstacles. Moreover, if companies prioritize profitability over increasing their production capabilities, it could lead to lower-than-anticipated levels of production in US shale.

The future prospects for Russia's production are uncertain as they heavily rely on various factors such as the severity of the EU's embargo, restrictions imposed by the G7 regarding prices, and limitations in redirecting exports. Additionally, if policy interest rates remain high for a prolonged period of time, it could negatively affect global growth and ultimately impact the demand for oil. However, there could be some potential relief if strategic oil inventories are refilled, although the U.S. has mentioned that this process would take several years.

1.3.2 AGRICULTURAL COMMODITIES

The grain price index of the World Bank saw a decline of approximately 5% in the beginning of 2023, although it still remains significantly higher than its average before the pandemic. This can be attributed to initiatives like the Black Sea Grain Initiative, which help Ukraine's grains and oilseeds gain access to the global market, and also to favorable harvests in other major producing countries, which have helped to ease price pressures. However, the price of rice has increased by 11% due to a combination of factors such as high demand during major festivals, restocking in Asian countries, currency appreciation against the US dollar in India, Thailand, and Vietnam, as well as supply challenges in most of Asia's rice-producing nations during the 2022-23 season (World Bank Group, 2023, p. 19).

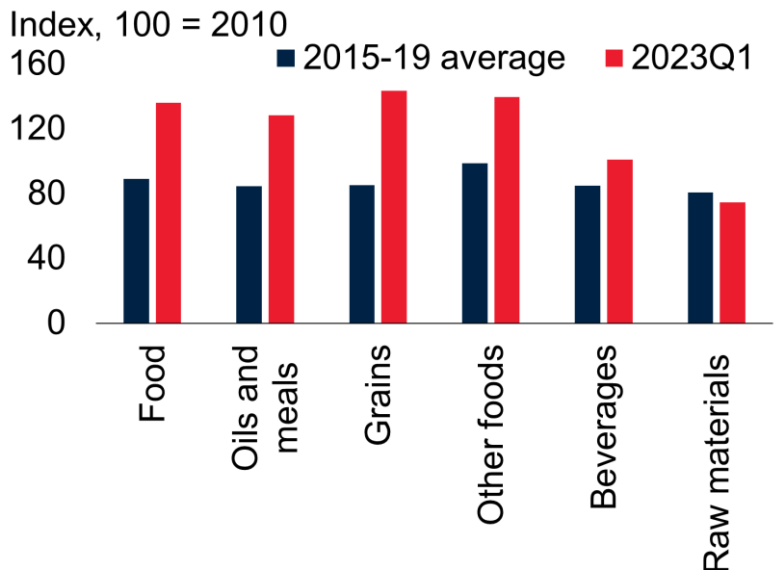

Figure 9. Agricultural price indexes (Source: World Bank).

The World Bank's **index for oils and meals** experienced stability at the beginning of 2023 after a gradual decline from the end of 2022, but it still remains significantly higher – 52% – compared to the pre-pandemic average. The drop in prices can be partly attributed to the Russia-Ukraine conflict. Soybean oil prices decreased by 20%, while rapeseed oil and sunflower oil prices saw a decrease of 1% and 12%, respectively, between 2022 and 2023. On the other hand, groundnut, fishmeal, soybean meal, and palm oil prices have increased. The overall increase in edible oil supplies in 2022, the impact of initiatives like the Black Sea Grain Initiative, the lifting of export bans, and improvements in global supply chain conditions have all contributed to the reduction in prices.

Cotton prices have seen a small decline in the first quarter of 2023, dropping by 28% compared to the previous year. This decrease can largely be attributed to a global decrease in consumption. It is worth noting that while the demand for cotton continues to decline, its production is shifting from countries like Australia, Cote d'Ivoire, Mali, and Pakistan to China and India. Despite the decline in 2023, cotton prices are expected to show a slight increase in 2024, mainly due to reduced plantings in major producing countries such as the United States.

In the first quarter of 2023, **natural rubber** prices went up by 7%, but are still significantly lower by 22% compared to the same time last year. This decline in prices can be attributed to slow growth in the production of automobiles, as nearly two-thirds of natural

rubber is used in tire manufacturing. However, as demand for natural rubber, particularly in China, continues to grow, it is expected that prices will increase by more than 7% in 2024.

The **grains price index** saw a decrease of 10% in 2023 and is expected to fall by an additional 8% in 2024, after experiencing a significant increase of 21% in 2022. This forecast is based on the assumption that there will not be any further disruptions from the war in Ukraine. The decline in prices can mainly be attributed to successful harvests in key grain-producing countries such as Canada, the US, and Australia. Further support for the projected decline in prices comes from efforts to revive Russia's production, as well as the lifting of export bans.

In 2023, the prices of **wheat** and **maize** declined due to weak global demand, while rice prices are expected to decrease in 2024 as Pakistan's exports recover, and the high rice prices in 2023 motivate production in other countries. Global grain supplies are expected to bounce back after the supply contraction in 2022, given the current situation. Brazil, benefiting from favorable weather conditions, saw a record-breaking grain harvest in 2023, and other regions are also expected to have higher stock-to-use ratios. The planting conditions are favorable for a higher global production of oilseeds, oil meals, and vegetable oils compared to the previous season. Surveys for planting intentions have been conducted, with the United States planning to significantly increase the acreage for both maize and wheat, which may further result in lower future prices (World Bank Group, 2023, p. 21).

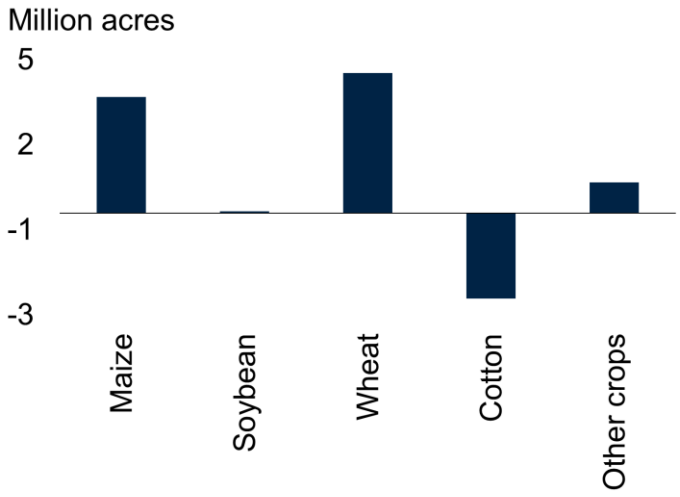

Figure 10. Changes in planting intentions in the United States in 2023 compared to area planted in 2022 (Source: US Department of Agriculture).

Several factors may determine the rise or the decrease of food price.

Trade restrictions and related policies. The expansion of active trade restrictions, such as export bans and licensing requirements, in response to inflationary pressure in 2022 is a significant factor. However, with many of these restrictions set to expire soon, there will be downward pressure on prices as improved signals allow global markets to adjust.

Geopolitics. The ongoing war in Ukraine poses a major risk that could impact wheat, maize, oilseeds, and fertilizer markets. The agricultural products leaving Ukraine face new challenges due to logistical issues, such as shortages of trains and trucks, leading to the blocking of imports and transit by Ukraine's neighbors. Geopolitical factors, including logistics, are pivotal in shaping market dynamics.

Weather. It is important to mention that certain raw materials, such as coffee, rice, palm oil, and natural rubber, are highly sensitive to weather variations. The El Niño Southern Oscillation (ENSO) phenomenon can have a significant impact on these commodities by causing record warm temperatures and altered precipitation patterns, which can affect crop yields worldwide, particularly in the Southern Hemisphere (World Bank, 2015). The occurrence of droughts during El Niño can negatively affect crops such as coffee, cocoa, and rice, while excess rainfall can lead to diseases that impact rubber trees.

Climate change. Climate change presents a major threat to food security, as it increases the likelihood of shortages and hunger by causing desertification, land degradation, crop failures, and damage to food supply infrastructure. According to model-based forecasts, cereal prices are estimated to increase by 7.6% by 2050 due to the effects of climate change (IPCC 2019). As global temperatures rise, droughts are expected to occur more frequently, and many regions will face more intense extreme rainfall events. Efforts to combat climate change, such as new environmental legislation introduced by the EU, seek to reduce global deforestation and restrict the production of food commodities like cattle, cocoa, coffee, palm oil, and soybeans in forested areas. This creates uncertainties in agricultural markets and has an impact on raw materials like wood and leather.

Biofuels. The increasing production of biofuels in the United States, along with favorable policies in Brazil, Indonesia, and Malaysia, will continue to drive demand for ethanol and biodiesel. As a result, prices for maize, soybeans, and oilseeds are likely to increase. The shift towards electric vehicles, particularly in the United States, may lead to a gradual decrease in demand for fossil fuels and ethanol. However, this is unlikely to greatly

impact biodiesel, as electric vehicle technology is not yet widely used in heavy trucks and machinery that require diesel fuel. In anticipation of this shift, adjustments may need to be made to biofuel policies to limit the rising prices of corn and soybeans, as they should not be used as a price-elastic alternative fuel.

Changing market structure. Alterations in market structure, such as higher concentration, can also contribute to price uncertainties. For instance, in the rice market, India has replaced Thailand as the leading exporter, resulting in its market share in rice exports increasing from 25% to 40% in just five years. Additionally, frequent trade restrictions imposed by India, coupled with changes in market concentration, can drive prices up, especially when accompanied by distortionary practices (Laborde and Mamun, 2022). The coffee market has also experienced increased concentration, with the top five exporters now accounting for 80% of all exports, which can lead to price volatility.

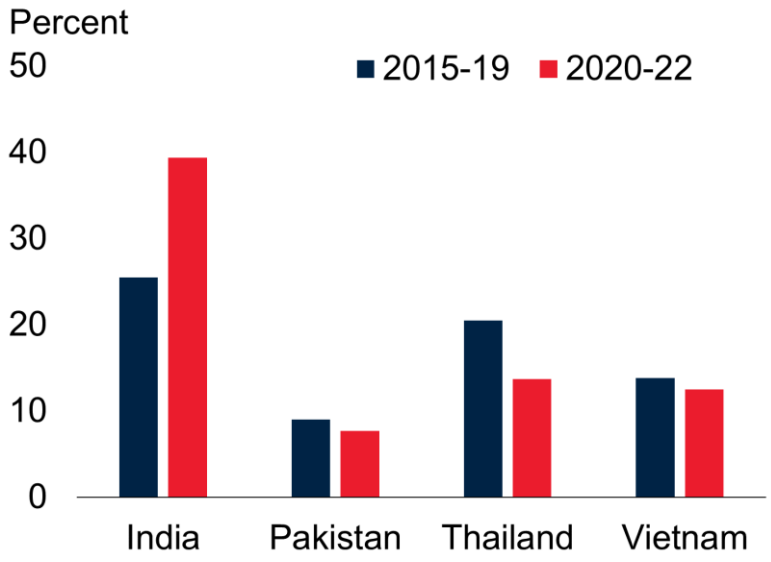

Figure 11. Export shares, major rice producing countries (Source: OECD-FAO).

Conflicts, economic shocks, climate extremes, and rising energy and fertilizer prices could potentially lead to food insecurity for 349 million people in the near future (WFP 2023). Low-income countries, particularly in Africa, are particularly vulnerable to food shortages exacerbated by natural disasters. At the beginning of 2023, the global domestic food price inflation rate was around 19.5% year-on-year, with significant variations observed in different countries. The highest food price inflation was seen in the Middle East and North Africa region, followed by individual countries in other regions. The COVID-19 pandemic has

also added to the global food security challenges by disrupting food supply chains and causing significant economic setbacks, further exacerbating the issue of food insecurity. In early 2023, food price inflation crossed 100% in countries such as Argentina, Lebanon, and Zimbabwe, while many others saw inflation rates over 30%. One of the main factors contributing to this issue is the government's imposition of trade restrictions, which unexpectedly increases cost-push pressures on food prices. This further compounds the challenges faced by countries already struggling with fragility, conflict, and violence, as well as those recovering from natural disasters. It is imperative for countries to prioritize the development of effective strategies to ensure food security for their citizens, particularly during times of crisis and upheaval.

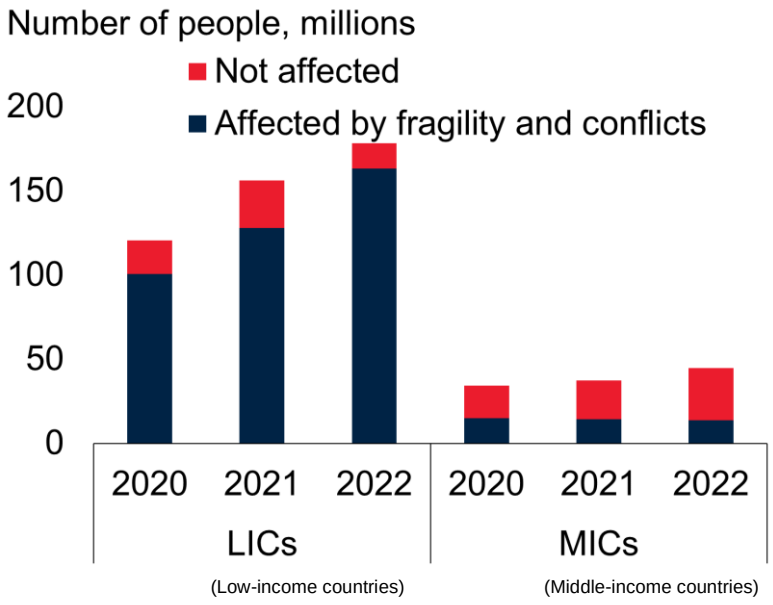

Figure 12. Number of people with food insecurity by fragility and conflict situations (Source: EM-DAT).

1.3.3 METALS AND MINERALS

China has a significant influence on metal prices, especially the World Bank's metals and minerals price index, which saw a 10% increase in the first quarter of 2023 due to China's economic recovery. This surge affected all metal prices, with notable increases seen in iron ore and tin. However, these prices have since dropped, except for iron ore, which remains strong due to high demand from China's steel industry. The overall trend for metals prices between 2023 and 2024 is expected to be a decline of 11%. One of the main risks to

this price forecast is the possibility of a stronger-than-expected recovery in China's real estate sector, combined with supply disruptions caused by trade restrictions. In the long run, initiatives like the energy transition could significantly increase the demand and prices of certain metals like copper, aluminum, and nickel. These changes in demand highlight the ever-changing nature of the metals market, with global economic trends and sustainability efforts playing a significant role in shaping future prices (World Bank Group, 2023, p. 26).

Iron ore. The current cost of iron ore has seen a significant increase in comparison to 2019. This is largely due to a seasonal spike in China's steel production, causing steel prices to rise and creating a higher need for iron ore. While there have been disruptions to seaborne shipments of iron ore due to weather-related problems, there has still been a moderate growth in the latter half of the year. Despite the mentioned factors, projections suggest a 4% drop in iron ore prices by 2024. This decrease in demand for the commodity can be attributed to a decrease in China's steel production, as the Chinese government looks to restrict steel manufacturing to combat pollution concerns. In the long run, to make up for China's restrictions, new mines in other countries such as Africa, Australia, and Brazil are expected to contribute towards the supply of iron ore. However, there may be a slower growth in overall demand.

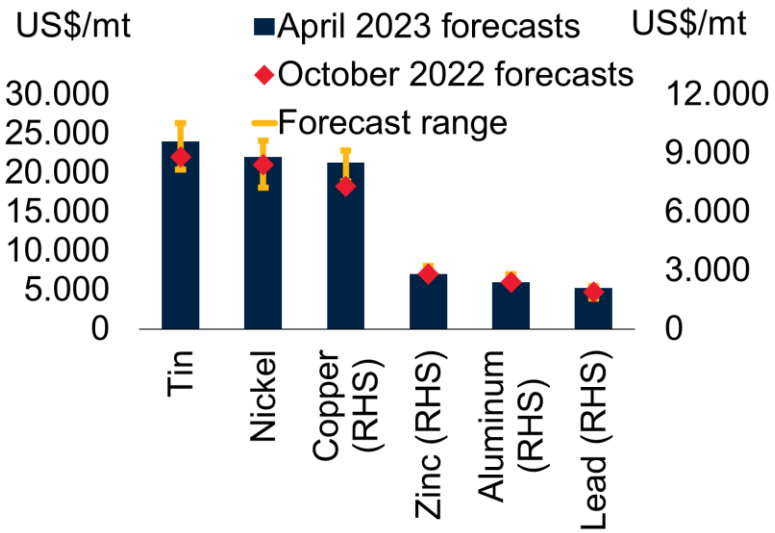

Figure 13. Metal price forecasts for 2023 (Source: World Bank).

Aluminum. The cost of aluminum has increased by approximately 35% in comparison to pre-pandemic levels. Once again, China is a major player in this trend. The surge in prices

at the beginning of the year was due to positive expectations for China's reopening and decreased inventories. However, a decline in seasonal demand and rising inventories have reversed this pressure and prices have since decreased. It is predicted that demand in China will have moderate growth for the remainder of the year, while elsewhere, consumption may remain stagnant or decline as economies in Europe and North America slow down. In the region of Yunnan, the largest aluminum smelters in China have been facing power shortages due to a drought, as aluminum production requires a large amount of energy. Despite this, it is expected that aluminum supply will increase in 2023 as China builds new capacity in other countries and lower energy costs allow for the restarting of existing smelters. China, with a self-imposed production cap of 45 million tons per year to decrease carbon emissions, will have to look towards countries with inexpensive and environmentally friendly energy sources if they wish to continue expanding their production after 2023. This increase in production is expected to cause an 11% drop in aluminum prices by the end of 2023. The projected increase in prices for 2024 is around 2%. Despite this, the utilization of aluminum in various goods such as power transmission systems, electric cars, and solar panels is expected to drive its production and ultimately result in a decrease in the price of aluminum in the future.

Since the pandemic, there has been a significant increase of approximately 35% in aluminum prices. The initial boost in January was due to positive expectations for China's economic recovery, along with a decrease in inventories. However, a seasonal decline in demand from China and an increase in inventories have led to a reversal in price trends. While China's demand is predicted to continue growing, consumption in other parts of the world is expected to remain stagnant or decrease due to economic downturns in Europe and North America. Additionally, the high energy requirements for aluminum production also contribute to the fluctuation in prices. Despite these challenges, it is estimated that there will be a rise in aluminum supply in 2023 as China expands production capacity outside of the country and lower energy costs enable the reopening of existing smelters. In an effort to reduce carbon emissions, China has imposed a self-imposed limit of 45 million tons of annual aluminum production. If there are plans for further expansion of production capacity, it is recommended that such efforts take place in countries where energy is affordable and environmentally friendly. This projected increase in production is expected to result in an 11% reduction in aluminum prices by the conclusion of 2023. Despite the likelihood of short-term

price fluctuations, the use of aluminum in multiple items like power transmission systems, electric cars, and solar panels is predicted to support future production growth, leading to a continuous decrease in aluminum prices.

Copper. In 2022, there was a significant increase of 54% in copper prices, compared to the average from 2015-2019, followed by another 11% increase in 2023. This sudden surge in prices was attributed to optimistic expectations for a strong recovery in the real estate sector in Beijing, as China accounts for 57% of global copper consumption. However, as the recovery in China did not have as much of an impact on the demand for copper as initially expected, prices gradually decreased throughout the year. This trend showcases the complex and interconnected nature of the global copper market, where economic conditions, especially in major consumer countries like China, heavily influence the pricing of this crucial industrial metal.

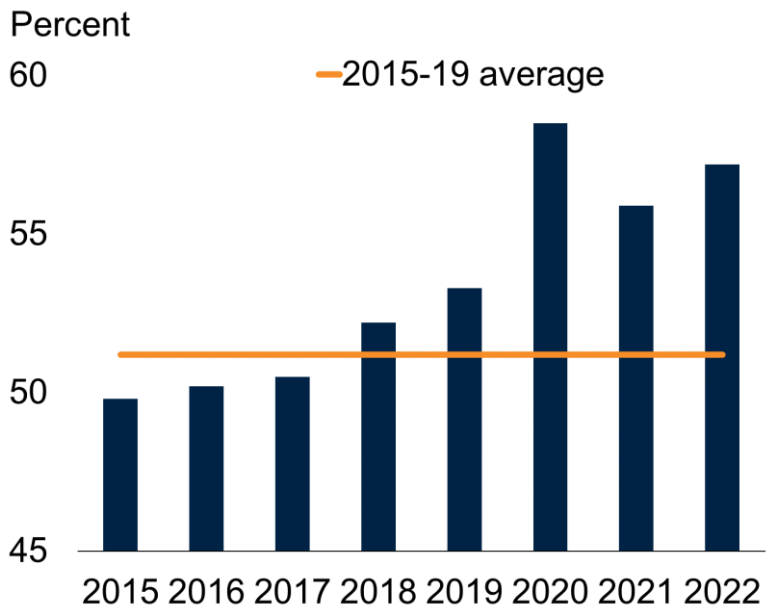

Figure 14. China's share in global copper consumption (Source: World Bank).

The slowdown in the real estate sector of other emerging economies also had an impact on copper demand growth. Additionally, production disruptions in the top three global copper producers - Chile, Peru, and the Democratic Republic of Congo - as well as in Indonesia and Panama, contributed to price increases in the first quarter. As supply conditions improve, copper prices are expected to decrease by approximately 6%. In the

long run, the key drivers for demand will be electric vehicles, renewable energy, and the associated infrastructure for electric grids, highlighting the need for increased investment in order to meet the demand.

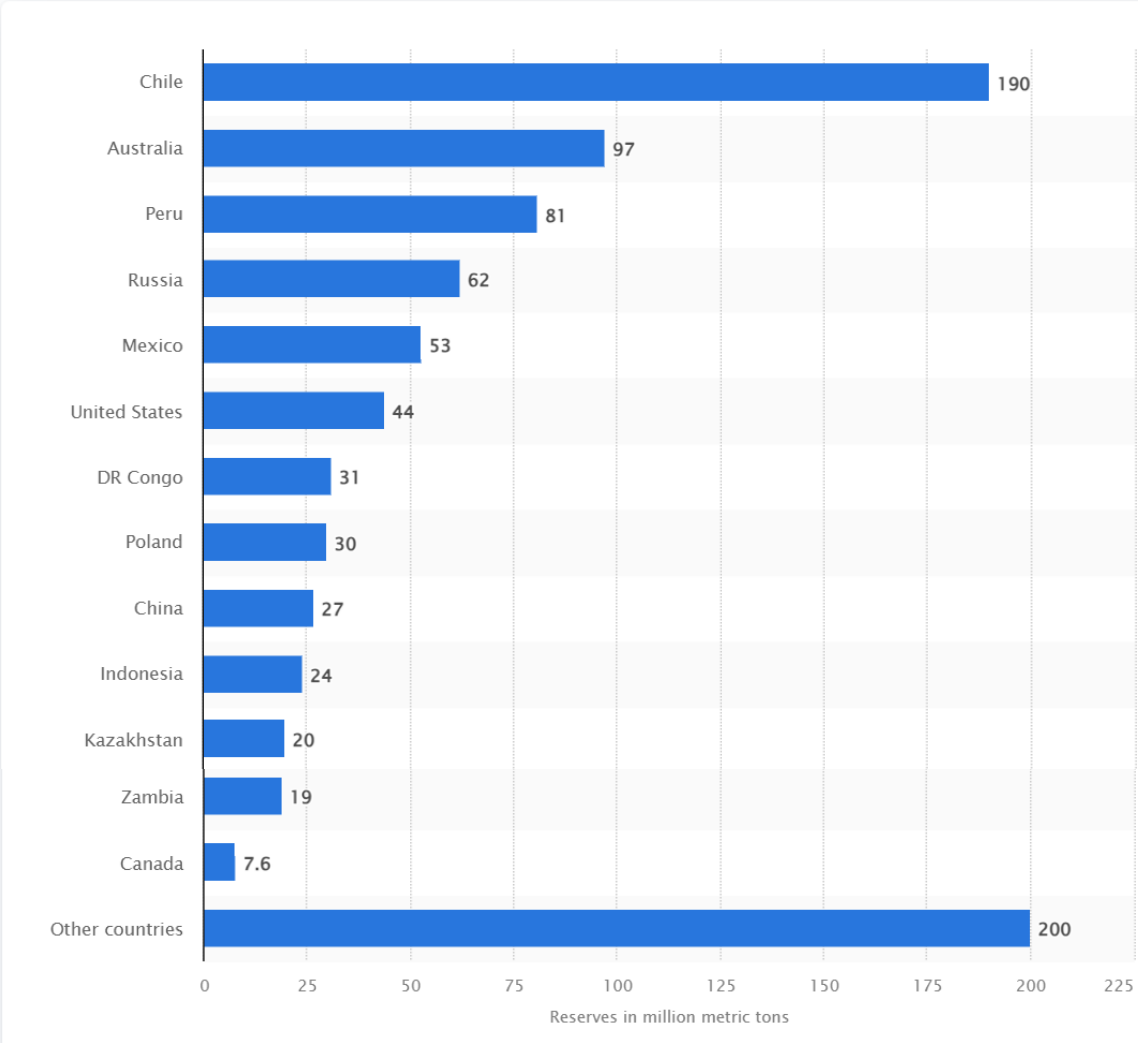

Figure 15. Reserves of copper worldwide in 2022, by country (Source: IAE).

Zinc. The increase in zinc prices, which had already risen by 27% in 2019, continued with a 4% increase between 2022 and 2023, fueled by positive expectations for China's recovery. Despite recent growth in stocks, they remain relatively low due to a significant decrease in 2022. Similarly to copper, the high costs of energy during this time led to the closure of numerous zinc smelters in Europe, as well as in Australia, Canada, and Mexico. However, with the recent decrease in energy prices (although still higher compared to 2019), smelters are reopening, contributing to the rebound in zinc prices, although a further 4%

drop is expected in 2024. While China's zinc demand is predicted to continue growing, demand growth in other regions is expected to be minimal due to slower economic activity. Both demand and supply are expected to increase in 2024, with significant contributions from large projects in the Democratic Republic of Congo, Russia, and South Africa anticipated to dominate potential supply. This highlights the complex interplay of various factors that influence the zinc market, including energy costs, economic trends, and global supply dynamics.

Some potential risks to the forecast for prices include **China's economic recovery**, **production constraints**, unclear **trade policies**, and the progress of the **energy transition**.

A strong **recovery in China's** real estate sector could increase prices for construction materials, including aluminum, copper, iron ore, and zinc. Disruptions at mines caused by weather, technical issues, labor disputes, and **limitations** on power/water availability could also impact raw material supply for various metals, particularly in regions such as Africa, the Americas, Australia, and Asia.

Trade restrictions could present potential advantages for metal prices. For instance, the Philippines, which is the world's second-largest producer of nickel, is considering implementing an export tax on nickel, following in the footsteps of Indonesia's nickel export ban set to take effect in 2022. While this action may tighten availability and potentially drive nickel prices higher, its impact is projected to be minor due to the fact that the Philippines only contributes approximately 15% of the global production of mined nickel. In addition to nickel, Indonesia is also considering imposing a tax on tin exports as a means of encouraging investment in value-added processing. As tin is currently exported as refined metals rather than ore, initiatives to promote further downstream processing could further limit an already constrained market supply.

In addition, **slower growth** in advanced economies could pose a risk to the projected prices, potentially leading to decreased consumer confidence, investment, and demand for base metals. It is worth noting that aluminum, copper, nickel, and tin have a significant role in the construction of **renewable energy infrastructure**, including wind turbines, electric vehicles, solar panels, and power grid systems. With the emergence of new technologies like hydrogen-based energy, the demand for these types of metals could further increase. This demonstrates the complex and interconnected factors that impact metal prices in the worldwide market.

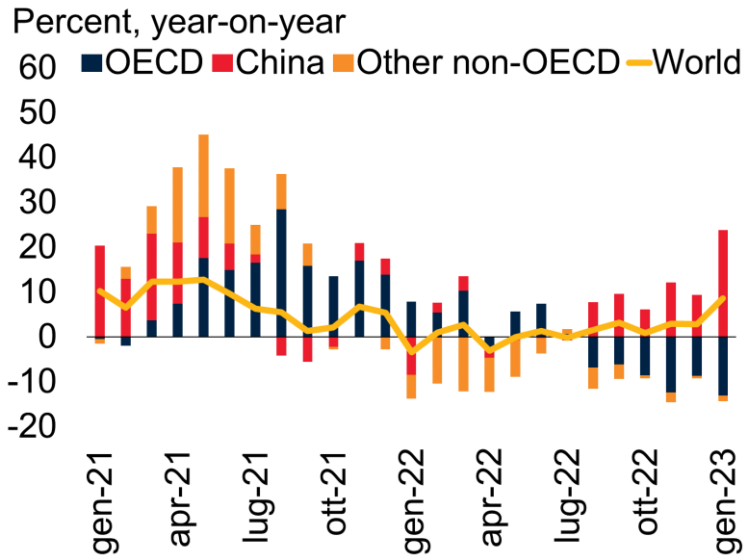

Figure 16. Metals demand growth (Source: PECD 2023).

1.4 MONITORING CRMs CONSUMPTION

The **EU Raw Materials Information System (RMIS)** was created by the European Commission in recent years to oversee the supply and utilization of essential commodities. It facilitates the organization of other EU-related data and knowledge on raw materials for the benefit of various users. This initiative involves collaboration between industry representatives and stakeholders from different countries.

In 2015, the Commission unveiled a comprehensive study known as **Material System Analysis (MSA)**, which examined the movement and reserves of 28 raw materials. This analysis aims to track materials throughout their entire life cycle, facilitating the identification and quantification of potential primary and secondary sources, and assisting in assessing their "level of circularity" within the EU-28. This approach is particularly crucial for critical raw materials (CRMs), as their trade information is often undisclosed, and their recovery and reuse rates after disposal are generally low. The data gathered from the 2015 MSA study serves as a vital basis for background information, enabling the development of strategies for ensuring supply security and promoting sustainable development. A comprehensive evaluation should consider not only the resources present in the ground (reserves) but also those available in current stocks and accessible through recycling. The current MSA coverage has been expanded to include 32 materials, with the most recent update published in 2020 (https://rmis.jrc.ec.europa.eu/msa):

1. Aggregates
2. Aluminum
3. Antimony
4. Beryllium
5. Borate
6. Chromium
7. Cobalt
8. Coking Coal
9. Copper
10. Fluorspar
11. Gallium
12. Germanium
13. Indium
14. Iron
15. Lithium
16. Magnesite
17. Manganese
18. Natural Graphite
19. Nickel
20. Niobium
21. Phosphate Rock
22. Palladium
23. Platinum
24. Rhodium
25. Europium
26. Terbium
27. Neodymium
28. Dysprosiu
29. Erbium
30. Yttrium
31. Silicon Metal
32. Tungsten

The Material System Analysis (MSA) offers a comprehensive visualization of material flows, tracing their path as raw materials, components, and finished products. The analysis showcases the entry of materials into the EU, encompassing extractions and imports, as well as their circulation within the economy, including factors such as production, consumption, and exports. The criteria used in the analysis serve to describe the physical movements throughout the material's lifespan, determine its criticality level, and forecast future supply and demand. Additionally, the MSA collects data on additions to stock and the end-of-life phase, providing insights on disposal or recovery processes. It also addresses the security of supply by examining country concentration, potential substitutes, and expected future demand for materials.

Initially created and released for the EU region in 2015, the MSA methodology was revised in 2020 (Torres de Matos et al., 2020). The European Commission is actively dedicated to ensuring the availability and accessibility of raw materials for European industry, in alignment with the objectives of the EU Raw Materials Initiative. A comprehensive inventory of material flows within the industry and society is deemed essential for providing evidence, facilitating discussions, and guiding decision-making processes pertaining to the supply of raw materials.

Five tasks were performed by the project team to come up with a data inventory for the MSA:

- In **Task 1**, a comprehensive review was conducted to gather a detailed understanding of existing literature and data sources essential for a thorough Material System Analysis (MSA). This involved the meticulous examination of specific indicators relevant to the MSA, allowing for a holistic overview of material flows and stocks across various life cycle stages. By completing Task 1, the study laid the groundwork for a more informed and comprehensive Material System Analysis. This systematic overview is crucial for addressing knowledge gaps, improving data reliability, and ensuring the accuracy of subsequent analyses and decision-making processes related to the supply of raw materials.
- In **Task 2**, a procedural framework was established for the collection of information to construct the complete MSA inventory. This involved delineating a step-by-step process for acquiring data on material flows at both the macro and process levels. The procedure was designed to address identified data gaps, with a focus on filling these gaps through a combination of documented assumptions and insights gathered from expert input. After this task completion, the study laid out a practical and structured approach to collecting data for the MSA inventory. The inclusion of expert input and documented assumptions aimed to enhance the robustness of the analysis and compensate for any deficiencies in available data. This procedural framework set the stage for a more comprehensive and reliable Material System Analysis.
- **Task 3** involved a series of five workshops where selected experts were actively consulted to provide valuable feedback on the progress of the project. The primary focus was on seeking expert opinions related to data sources, data collection methods, and the overall methodology employed in the project. These workshops played a crucial role in ensuring that the MSA was appropriately set up and addressed the gaps in missing data sets for the 28 material groups. The input from experts in Task 3 played a vital role in refining and validating the project's approach. The collaborative nature of these workshops ensured that the MSA methodology was sound, and the gaps in data sets were effectively addressed, leading to a more reliable and comprehensive Material System Analysis.
- In **Task 4**, the project focused on the elaboration of the MSA database for the 28 groups of materials, covering the period from 2007 to 2012. This involved a systematic process of collecting and processing relevant data, followed by the

calculation of complementary data to enrich the analysis. Task 4 was fundamental to lay the groundwork for the subsequent stages of the MSA. The database elaboration process aimed to provide a robust and reliable foundation for the comprehensive analysis of material flows, contributing to a more nuanced understanding of the dynamics within the specified material groups during the selected time period.

- In **Task 5**, the focus shifted towards providing recommendations for the European Commission regarding the establishment, maintenance, and regular updating of a comprehensive Material System Analysis (MSA) database. This task aimed to offer guidance on creating a sustainable framework for ongoing data management and analysis in the realm of material flows. This task played a crucial role in providing a roadmap for the European Commission to establish and sustain a dynamic and effective MSA database, promoting transparency, informed decision-making, and a deeper understanding of material systems within the European context.

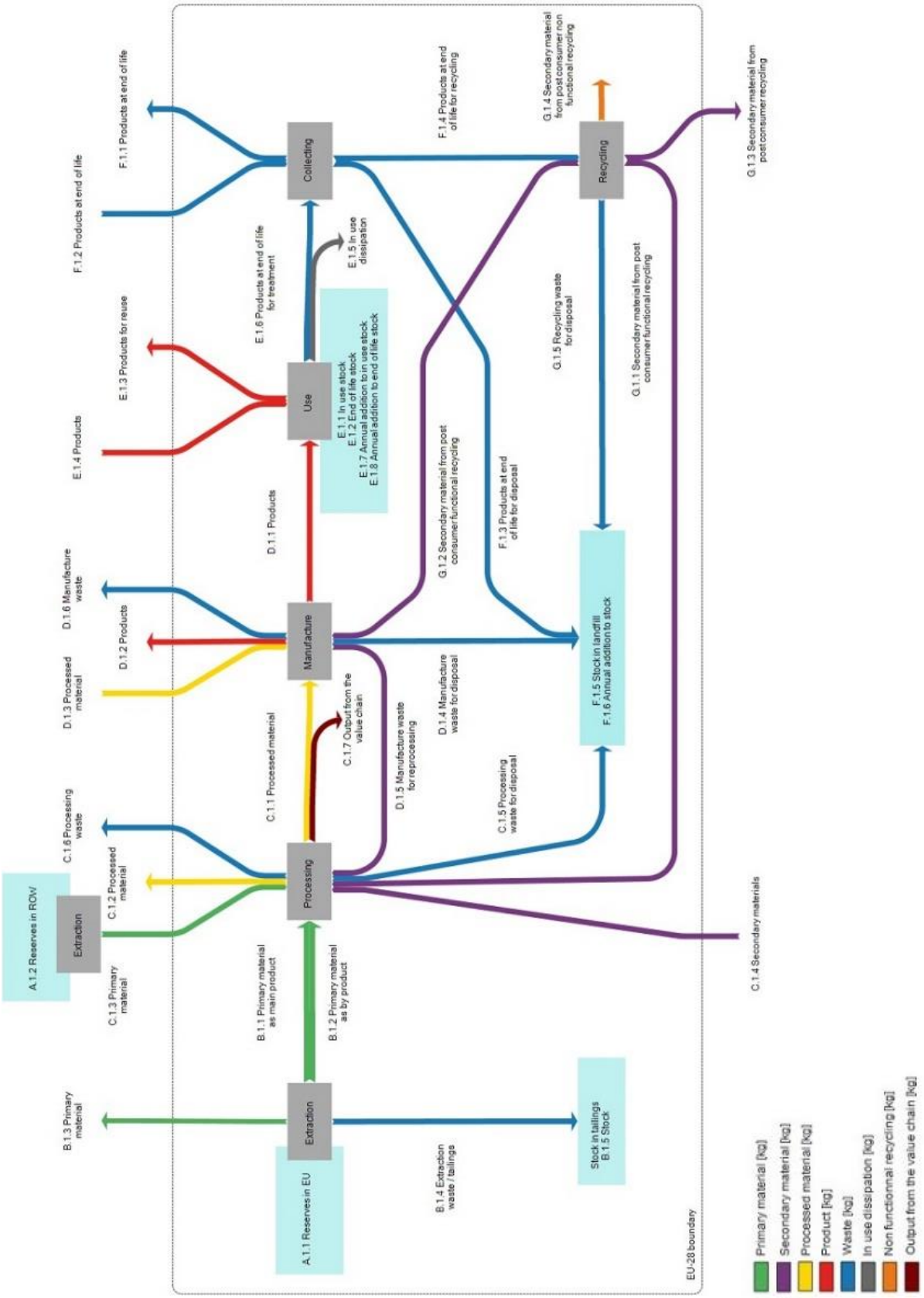

Figure 17. MSA framework (Source: European Commission, Joint Research Centre, 2021).

Although there is no universally accepted definition, the concept of the "circular use" of raw materials is actively monitored and evaluated in Europe through two significant frameworks: the "Raw Materials Scoreboard" and the "Circular Economy Monitoring Framework." These frameworks assist in tracking the progress of recycling processes for commodities and providing valuable insights into resource efficiency and circular economy initiatives. In light of the COVID-19 pandemic, the European Commission is placing greater emphasis on the circular use of resources as a means of achieving sustainability and resilience in the economy. This approach aims to decrease reliance on imported raw materials, minimize environmental impacts, and promote a more secure and sustainable supply of materials.

The **Raw Materials Scoreboard** provides information on the EU's overall raw materials policy context, taking into account 24 indicators grouped into 5 thematic clusters. The indicator on waste electrical and electronic equipment management shows that levels of collection, reuse and recycling of these materials vary considerably across the EU Member States, indicating a significant potential to improve resource efficiency.

The **Circular Economy Monitoring Framework** consists of 10 indicators designed to evaluate advancements in achieving a more circular economy and the effectiveness of EU and national actions. Many of these indicators apply to CRMs, such as the indicator for raw material self-sufficiency, recycling rates for waste electrical and electronic equipment, and the use of recycled materials (also found in the Raw Material Scoreboard). Another essential indicator is "resource productivity," which measures the economic value generated for each unit of resources consumed.

These monitoring frameworks play a vital role in evaluating the circular use of raw materials, providing policymakers, stakeholders, and the general public with valuable information on the EU's progress in resource efficiency, recycling, and the transition towards a circular economy. The indicators serve as a foundation for identifying areas in need of improvement and guiding future initiatives to enhance sustainability in the management of raw materials.

1.5 RECYCLING CRMs: CIRCULAR ECONOMY

In recognition of the significance of sustainable resource management and waste reduction, the European Commission launched a **Circular Economy package** in 2015. The circular economy is defined as a state in which the value of products, materials, and resources is maximized by prolonging their use within the economy and minimizing waste. This approach is considered vital for promoting a resource-efficient and competitive economy. Through these initiatives, the European Commission aims to encourage sustainable resource management, waste reduction, and the establishment of an economy that values and optimizes the use of materials and resources. The action plans and monitoring frameworks play a crucial role in directing and measuring progress towards a circular economy in the EU (Gislev and Grohol, 2018).

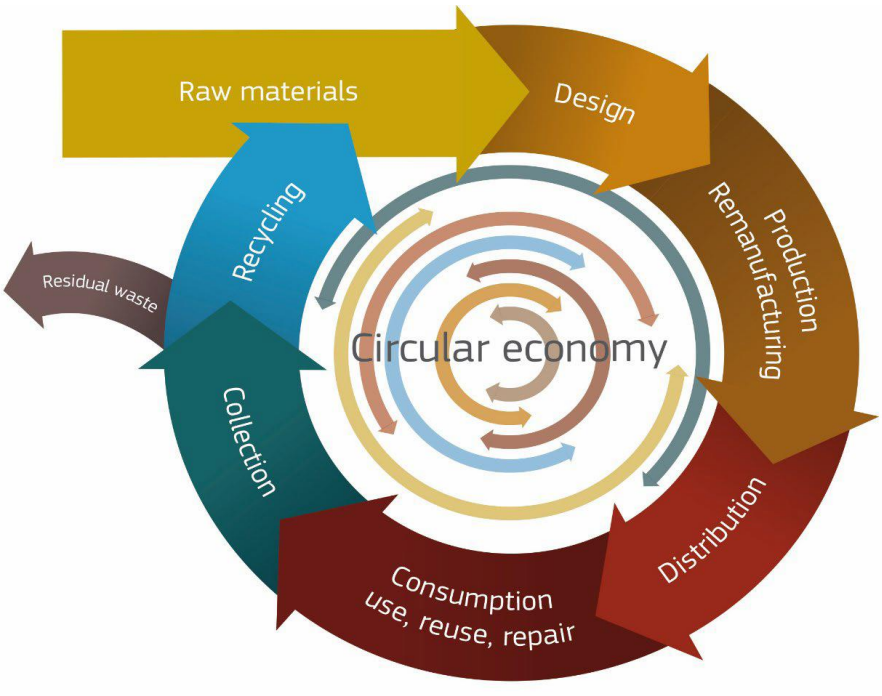

Figure 18. Circular economy (Source: Gislev and Grohol, 2018).

A material flow analysis (MFA) offers a detailed dataset used to measure the quantity of materials entering and exiting the economy and to track their use within society, including the recycling process and how much is stored, providing insights into their circularity level. The key distinction between material system analysis (MSA) and material flow analysis (MFA) is that MSA utilizes specific boundary conditions within the confines of the European Union

and can provide information on the circularity of specific materials (European Commission, Joint Research Centre, 2021, page 60).

Despite the high technical and economic potential for recycling, there is no universally agreed definition for the circular use of raw materials, and its implementation faces challenges. Several factors contribute to the low recycling input rates seen in many cases. Some recycling technologies are still not cost-effective, preventing their widespread adoption. Additionally, many critical raw materials (CRMs) are tied up in long-term assets, such as infrastructure and durable goods, leading to delays between production and disposal, which negatively impacts current recycling input rates. There is often a higher demand for recycled materials than the available supply. The feasibility of recycling technologies varies among different CRMs. Economic factors, such as the cost-effectiveness of recycling compared to primary extraction, and the availability of suitable infrastructure, also play a role in recycling rates.

A multi-faceted approach is needed to tackle these challenges, involving advancements in technology, policy interventions, investments in research and development, and increased awareness of the benefits of circularity. Close collaboration between industries, governments, and research institutions is essential for making progress towards a more circular use of raw materials (Gislev and Grohol, 2018, page 10).

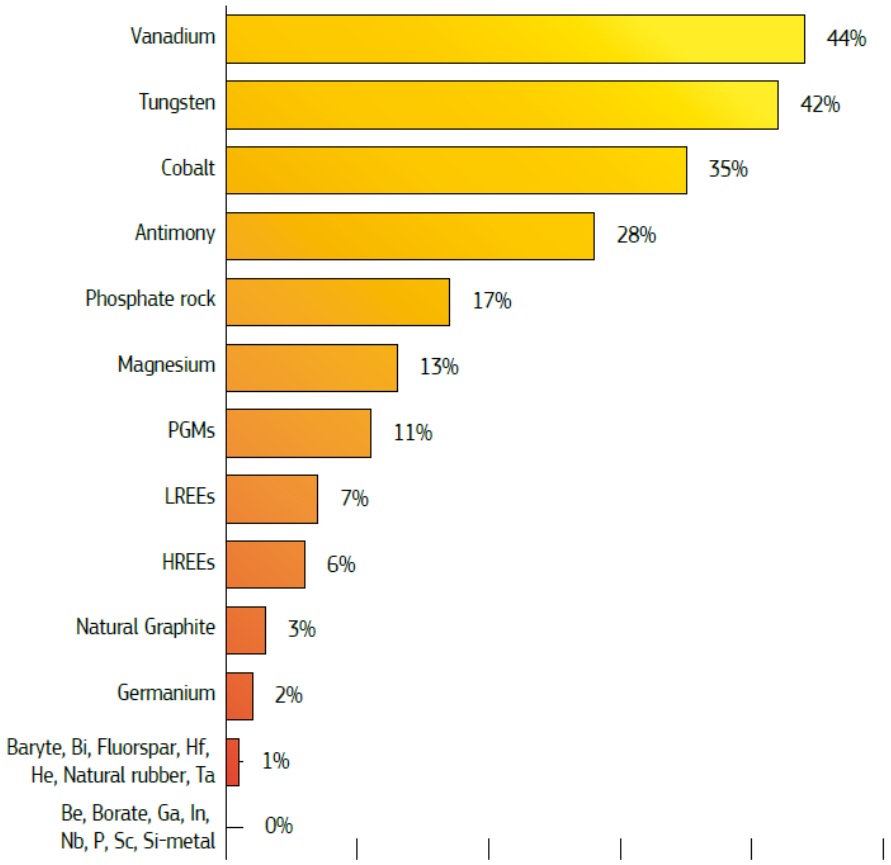

Figure 19. Current contribution of recycling to meet EU demand of CRMs 2017 (Source: Gislev and Grohol, 2018).

Many factors impact the circular use of CRMs. The length of time a material is available depends on the products it is used in and how it is handled at the end of its life cycle. The potential for reuse also influences the EU list of Critical Raw Materials, as it is a criterion considered when determining the list. In cases where recycling is not possible, certain CRMs may be lost through contamination or dissipative use (due to the linear nature of their consumption), while others remain within the economy indefinitely. Many CRMs are now stored in long-term assets such as buildings and infrastructure, and the potential for releasing them back into the economy should be explored.

1.5.1 RECYCLING'S CONTRIBUTION TO MEETING MATERIALS DEMAND

A key component of the EU Raw Materials Initiative and the Circular Economy Action Plan is the increase in secondary material supply through recycling. Moreover, improved product design can support the efficient recovery of high-quality materials. Recycling is a

complex approach that encompasses environmental, economic, and societal factors, making a substantial contribution to achieving the overall objectives of circularity and sustainability (European Commission, Joint Research Centre, 2021, p. 73).

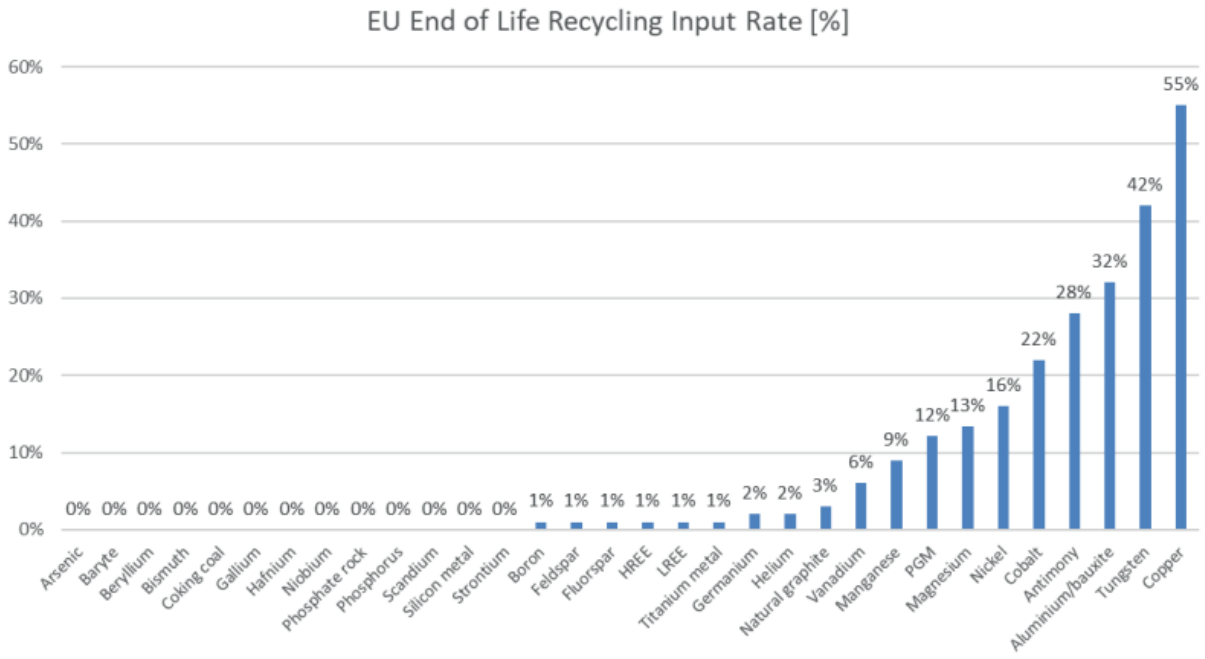

Figure 20. Recycling's contribution to meeting materials demand (End of Life Recycling Input Rate) (Source: European Commission, Joint Research Centre, 2021).

Nevertheless, there are multiple barriers to a further uptake of recycling:

- recovery of many materials from end-of-life products and waste streams is not economically feasible;
- there is a lack of suitable technologies or infrastructure available for collection and recycling;
- some materials are contained in long-life products (like buildings or other infrastructure);
- there are losses due to manufacturing or in-use dissipation;
- demand for several materials is growing.

In the EU 2020 criticality assessment, the **end-of-life recycling input rates (EOL-RIR)** for 83 candidate raw materials were analyzed and represented in the figure below. Lead has the highest EOL-RIR at 75%, the only material with a value above 50%. Fifteen materials,

including rhenium, tungsten, iron ore, tin, and zinc, fall in the 25-50% range, making a significant contribution to meeting the EU's demand. Although the EU has identified several critical raw materials, non-EU minerals such as tungsten (42%), europium (38%), yttrium (31%), palladium (28%), rhodium (28%), and platinum (25%) have high EOL-RIRs. The majority of specialty metals and rare earth elements rely heavily on primary extraction rather than secondary materials due to the lower cost. These materials are typically used in small quantities in current products, making the collection and recycling process expensive both economically and environmentally.

In terms of battery raw materials, the contribution of recycling to demand can vary significantly, with cobalt having a relatively established and efficient recycling chain at 22%, while lithium has almost no recycling contribution at 0%. Although lithium may be collected, it is not recovered due to its low primary price.

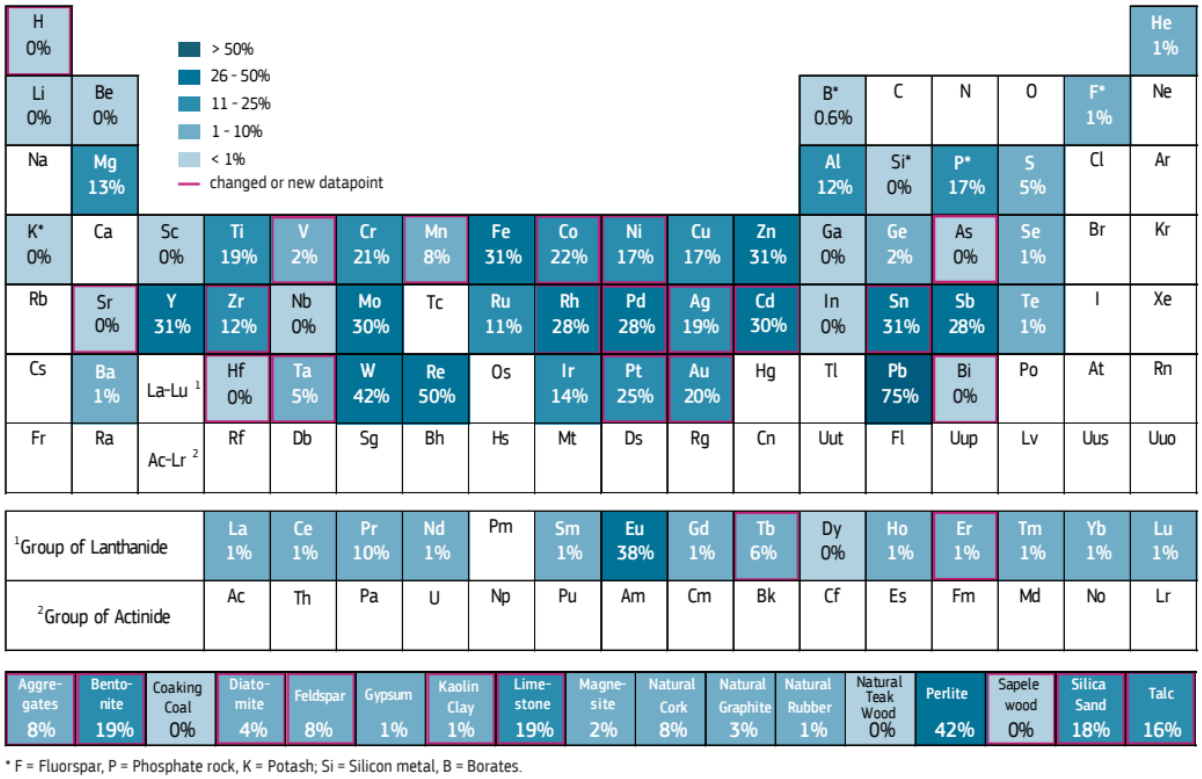

Figure 21. End-of-life recycling input rates (EOL-RIR) in the EU (2020) (European Commission, Joint Research Centre, 2021).

Despite some materials having high end-of-life recycling rates (EOL-RR) over 40% or 50%, their overall contribution to meeting demand (EOL-RIR) is relatively small. This is

especially true for popular metals like iron, aluminum, nickel, and manganese, as well as precious metals like platinum group elements. This is due to the increasing demand for these materials, highlighting the fact that the EU's recycling efforts are not fully meeting its growing requirements (European Commission, Joint Research Centre, 2021, p. 75).

In summary, recycling practices in the EU are well-established for certain metals, but there is still a shortfall in the supply of secondary materials to meet current demand. As technology advances and demand for materials increases, additional efforts are needed to maintain current recycling input rates (EOL-RIR). This highlights the importance of circular economy plans in improving materials recycling. By designing products for circularity, there is potential for more efficient collection and recovery, ultimately increasing the circularity of raw materials and enhancing the EU's resilience in its raw materials supply chains. This helps to minimize the risks associated with the EU's dependence on other countries.

1.5.2 EU MATERIAL FLOW IN 2017

Between 2010 and 2017, the majority of raw materials used in the EU (67% or 5.36 billion tons) were domestically extracted, while 21% (1.7 Gt) were imported, and 12% (0.72 Gt and 0.21 Gt respectively) came from recycling and backfilling activities. Out of the total 7.98 Gt of materials used in the EU economy, 31% (2.49 Gt) were consumed for energy, 10% (0.77 Gt) were exported, and 3% (0.26 Gt) were dispersed. Importantly for the circular economy, 56% (4.46 Gt) were utilized as materials, with 61% (2.72 Gt), mainly construction minerals, being used to build and maintain long-lasting societal stocks (such as buildings, infrastructure, and durable goods). These stocks can only be recycled once these goods reach their end-of-life. Out of the total generated end-of-life waste (1.75 Gt), 41% was recycled and 12% was backfilled (a total of approximately 0.92 Gt). Conversely, 3.31 Gt of materials exited the economy as emissions to air and water and waste disposal (European Commission, Joint Research Centre, 2021, page 60).

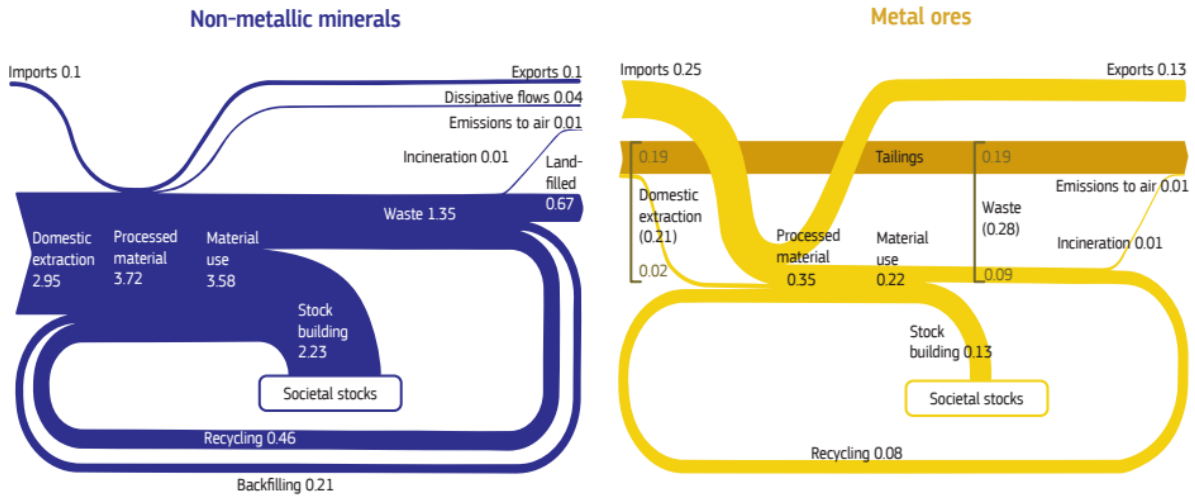

Figure 22. Material flows for single material categories in the EU economy (in billion tons/year) (EU-27, 2017).

The main materials processed in the European Union (EU) were **non-metallic minerals**, which included construction and industrial minerals and totaled approximately 3.72 Gt. Out of this amount, 2.23 Gt were utilized in societal stocks, while 1.35 Gt were collected for further processing. A significant portion of non-metallic minerals (0.67 Gt), which accounted for 18% of the total inputs, was recovered through recycling (0.46 Gt) and backfilling (0.21 Gt). This contributed to 8% of the EU economy's raw material input in 2017 through the recycling and backfilling of non-metallic minerals.

Metal ores constituted a minor part of the EU's material consumption by mass. In 2017, approximately 46% or 0.25 Gt of metals were imported into the EU, while domestic extraction yielded only 0.02 Gt of pure metal and 0.19 Gt of extractive waste, which was often disposed as end-of-life waste in tailings. Domestic recycling accounted for 23% (0.08 Gt) of the processed metals. Of these metals, 24% were incorporated into societal in-use stocks, while an equal share was exported. On the other hand, only 6% (0.02 Gt) of processed metals were utilized in backfilling.

The data analysis highlights that a significant portion of the EU's material usage is made up of construction materials, which tend to accumulate in long-term use. The degree of circularity varies depending on the material, with metals having the highest circularity. The proportion of recycled materials to the total material input in the EU's economy has remained consistent at 12% for the past seven years. To further improve circularity, it is necessary to reduce wasteful practices, minimize waste during manufacturing and

processing, increase the rates of reuse and recycling, and improve the durability and repairability of products in use. While primary resource extraction is still necessary, there is a need to focus on efficient resource use and domestic materials extraction along the value chain.

1.6 THE EU CRITICAL RAW MATERIALS ACT

To increase the EU's self-sufficiency in critical commodities that are essential for industries like renewable energy, digital technology, space, and defense, the European Commission has taken proactive steps. In March 2023, they proposed the Critical Raw Materials Act, which includes legislative measures to boost natural resource production. The Act also urges member states to intensify mapping, research, and innovation efforts to align with the EU's 2030 climate and digital goals. It is expected to be finalized in 2024, following its announcement in 2022 in response to the Conference on the Future of Europe and the European Parliament's resolution on an EU critical raw materials strategy in November 2021. The Critical Raw Materials Act, which is a part of the Green Deal Industrial Plan, aligns with the EU's Net Zero Industry Act and aims to establish a secure, sustainable, and competitive supply chain for clean energy, supporting the EU's climate and energy goals. Since 2011, the Commission has been working on critical raw materials and regularly updates the list of EU Critical Raw Materials every three years. The 2023 assessment evaluated 87 materials based on their supply risk and economic significance to the EU.

Critical raw materials are crucial components of the European economy, but their availability can be disrupted, especially with the increased demand brought on by decarbonization efforts. For instance, by 2030 and 2050, the demand for rare earth metals and lithium in the EU is expected to significantly rise. At present, the EU depends on imports, often from a single country, which has been highlighted by recent crises. The proposed Act highlights the urgency for collective action to protect European industries and support the EU's pursuit of its climate and digital goals.

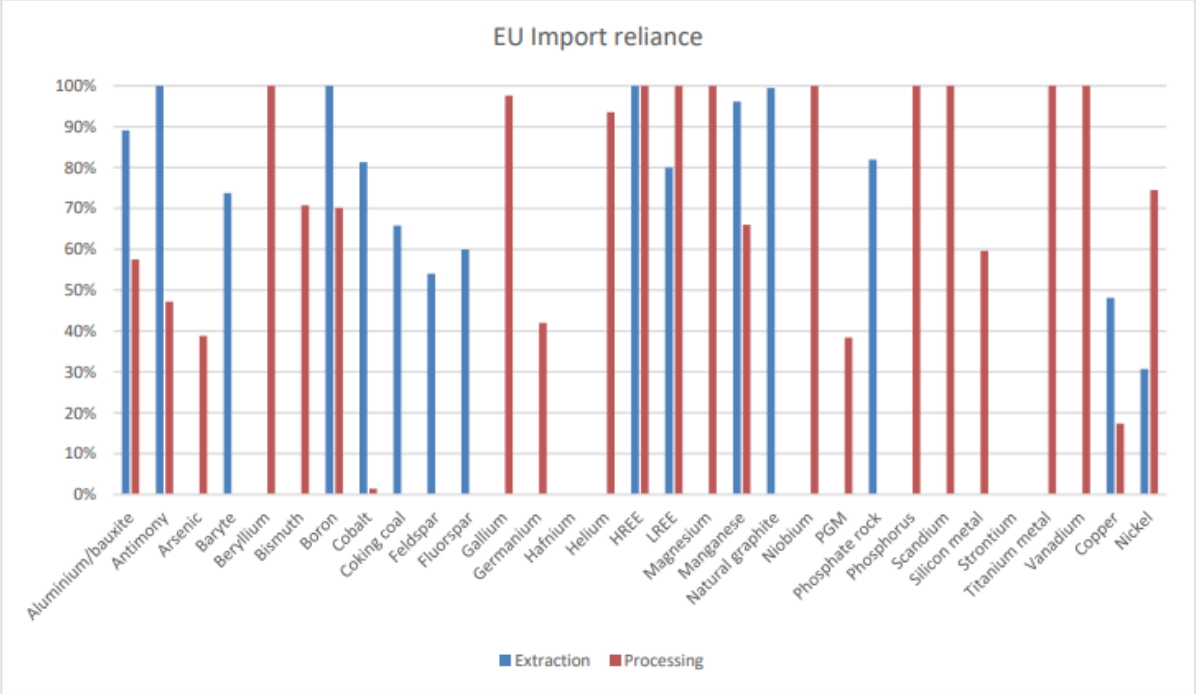

Figure 23. EU Import reliance for extracted and processed CRMs (Source: IEA).

The proposed Critical Raw Materials Act by the Commission is a comprehensive solution to address these challenges. Its aim is to ensure that the EU has strong, resilient, and sustainable value chains for critical raw materials. The proposed Regulation has various objectives, such as strengthening all stages of the EU's critical raw materials value chain, diversifying imports to reduce strategic dependencies, and enhancing the EU's capacity to monitor and mitigate risks related to the supply of critical raw materials. It also strives to improve circularity and sustainability. The EU will work in partnership with third countries to achieve these goals, promoting their own sustainable economic development while also establishing secure, resilient, affordable, and diversified value chains.

The Act lists both raw materials and strategic raw material, those most crucial for strategic technologies used for the green, digital, defense and space applications (Grohol and Veeh, 2023).

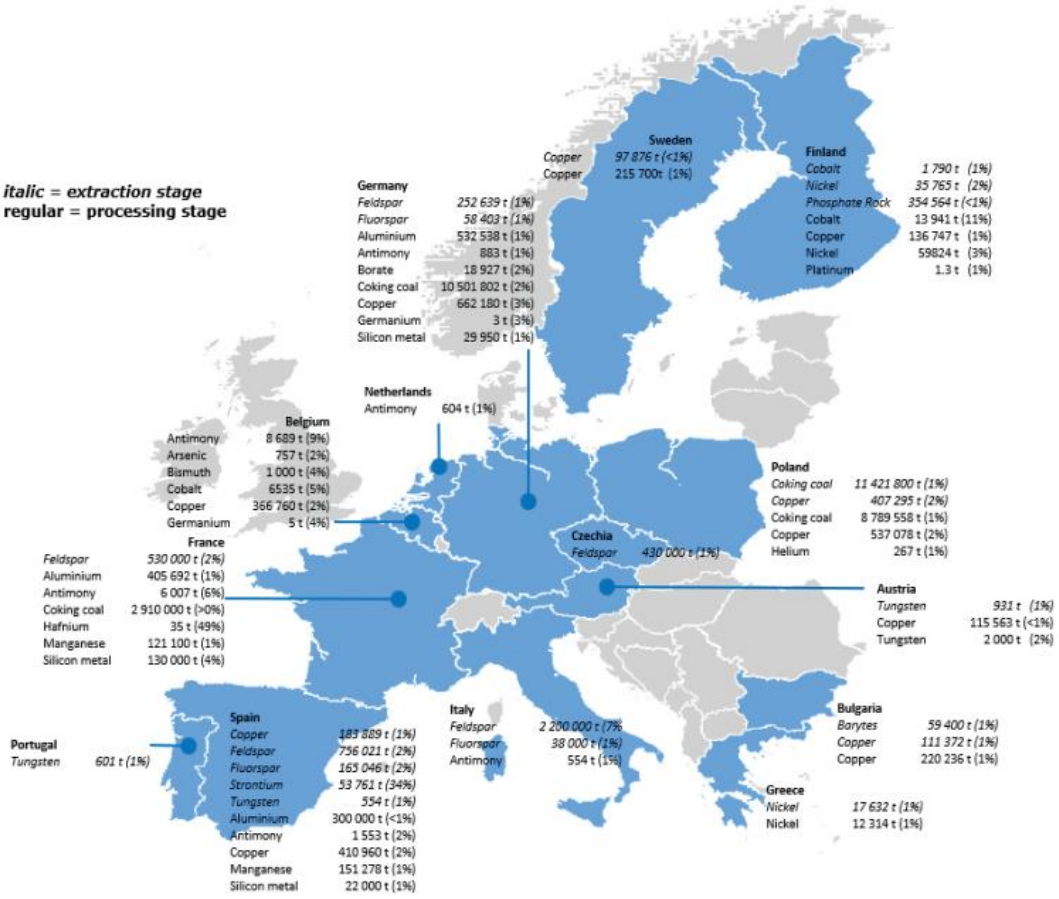

Figure 24. EU producers of CRMs, in brackets shares of global supply, 2016-2020 (Source: *Geological Survey of Sweden,* September 2023).

To diversify the EU supply, clear targets have been set for the union's internal capacity in terms of the value chain of the strategic raw materials (*Geological Survey of Sweden*, September 2023):

- for extraction (mainly mining): at least 10% of EU annual usage;
- for processing (smelters, refining): at least 40% of EU annual usage;
- for recycling: at least 15% of EU annual usage;
- no more than 65% of EU annual usage shall originate from one single third country, in any relevant part of the chain.

The proposed legislation prioritizes a swift, secure, and transparent permitting process for the entire raw materials supply chain to meet these targets and adhere to the EU's sustainability standards. This includes primary mining, secondary extraction from

mining waste, and the recycling of raw materials and products. The Act also aims to simplify administrative procedures for critical raw materials projects while maintaining high standards of social and environmental protection. Furthermore, member states are encouraged to create national programs for geological resource exploration to identify new resource pools and support EU industries while reducing reliance on imported materials.

The Act also highlights the importance of recycling critical raw materials. Countries are obligated to implement methods to increase the collection of waste that contains critical raw materials and promote its recycling into secondary materials. Private operators are also encouraged to explore the potential recovery of critical raw materials from extractive waste. Moreover, the Commission has the authority to establish regulations for the environmental impact of critical resources with the goal of raising consumer awareness and enabling them to make informed decisions. This effort aims to enhance the circularity and sustainability of critical raw materials in the EU market.

Monitoring is crucial in ensuring the resilience of the supply chain, and the Act introduces measures such as ad-hoc supply stress-testing, coordinated management of strategic stocks, and the imposition of risk preparedness obligations on major companies involved in producing strategic technologies.

International trade is essential to supporting global production and ensuring supply diversification. EU actions about this theme include:

- creating a critical raw materials 'club' for all interested countries to strengthen global supply chains;
- using trade agreements to secure and diversify CRMs trade;
- expanding the EU's network of strategic partnerships;
- using the Global Gateway for soft and hard infrastructure to deploy projects along the raw materials value chain and support connectivity;
- working with EU countries to set up an EU export credit facility to low the risk of investment abroad;
- tackling unfair trade practices related to raw materials and increasing enforcement.

In conclusion, the Act recommends establishing a **European Critical Raw Materials Board**, consisting of EU member states and the Commission, to ensure better coordination and effective implementation of the proposed measures.

Chapter 2

COMMODITIES SITUATION IN AFRICA

2.1 A SHIFT FROM EXTRACTORS TO MANUFACTURERS OF RAW MATERIALS

Africa has often been perceived by Western powers as a supplier of natural resources, and has been viewed as the birthplace of industrial advancements. This viewpoint can be traced back to the transatlantic slave trade, followed by European colonization, and more recently, the prioritization of critical raw materials essential for digital and climate technology dominance. In 1502, Europe began forcibly removing Africans and using them as laborers in the Americas to create raw materials that fueled their own industrial growth.

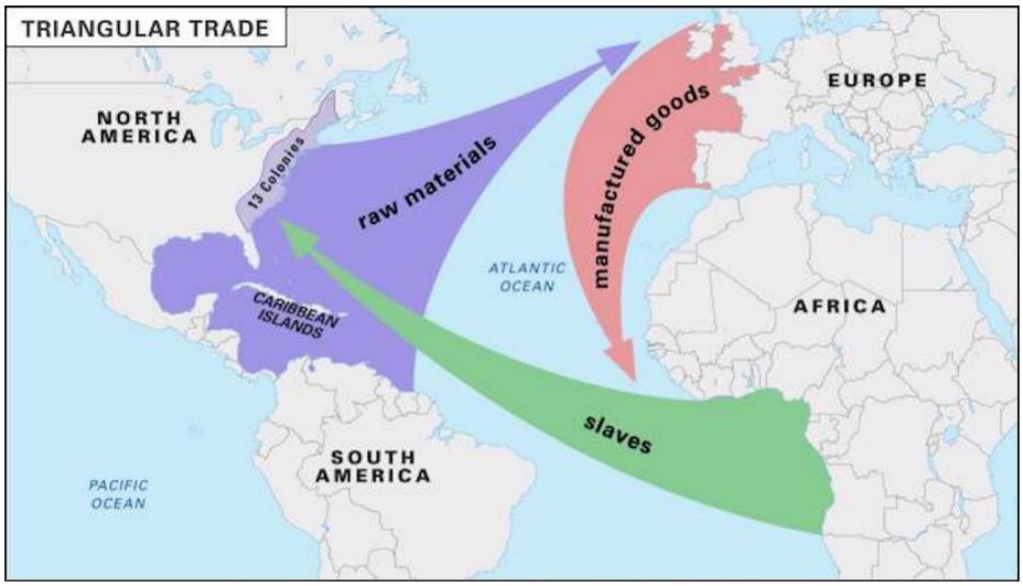

Figure 25. The Trans-Atlantic Trade in Africans as Slaves: Volumes and Destinations (Source: Mavhunga, May 2023).

During the period of the transatlantic slave trade, Africa was divided and exploited by European powers, including Britain, Portugal, France, Spain, Denmark, and The Netherlands. This division was primarily focused on the western and southeast coasts, ranging from Senegal to Angola and from Zanzibar to Maputo. African slaves were not only valued for their labor, but also for their skills and knowledge. The skilled ironsmiths of the Kongo region were especially in demand, as they were able to produce charcoal from wood and smelt iron ore for use in sugar mills. This practice was widespread in colonies such as Virginia, Guyana,

Jamaica, and southeastern Brazil. The introduction of the hoe in the Americas was yet another example of European exploitation of African expertise, rooted in their traditional mining and metallurgy.

As steam engines became more prevalent, European powers no longer relied on the importation of African slaves and instead turned to local enslavement. Africa's resources were exploited by European industries, and infrastructure such as roads, railways, and ports were designed to aid in the extraction and export of raw materials to be manufactured in European factories. This ultimately led to the colonization of Africa, with European nations formally dividing and occupying territories through the Berlin Conference of 1884-1885 (Mavhunga, May 2023).

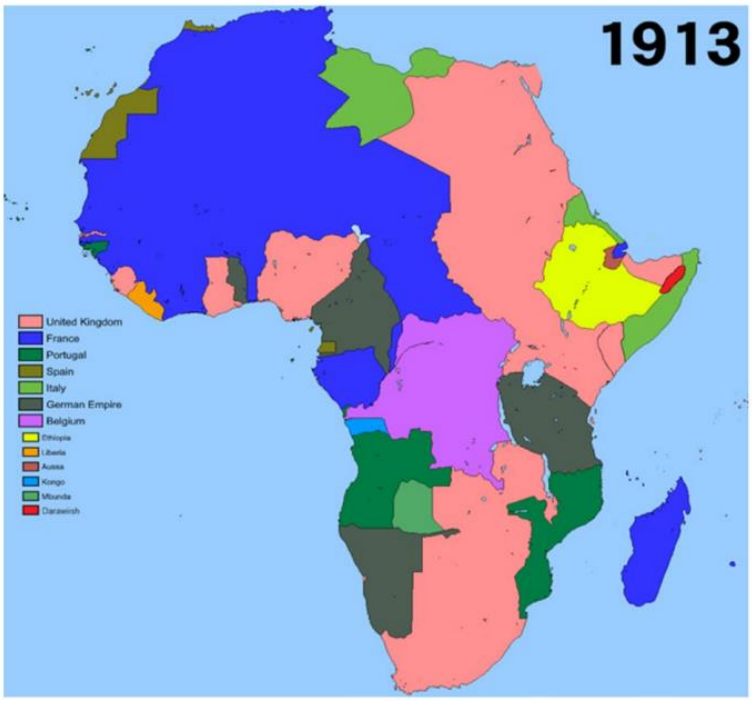

Figure 26. The European partition of Africa (Source: Mavhunga, May 2023).

Despite the end of the slave trade, Africa continues to be a major exporter of raw materials to North America, Europe, Asia, and Australia. These regions have designated Africa as a crucial supplier of Critical Raw Materials (CRMs), defined as minerals necessary for national security and economic development that are vulnerable to supply chain disruptions. As Western countries push for ambitious environmental goals, such as carbon neutrality by 2050, they heavily rely on transitioning to clean energy. This has led to the EU

and other countries looking to African resources to meet their demand for CRMs, reinforcing Africa's role as a provider of these crucial minerals.

Although extracting rare earths is necessary for the production of equipment that supports the shift towards renewable energies, this industry often utilizes methods that are not environmentally friendly. These methods rely on coal-fired, hydro-, and solar-powered processes and can lead to the exploitation of African labor, resembling modern-day slavery. Africa is a significant supplier of critical raw materials (CRMs) for Europe, particularly those needed for developing climate technologies. The EU invests around € 95.5 billion in this venture, highlighting the interconnectedness between continents in the pursuit of sustainable and innovative solutions (Mavhunga, May 2023).

A significant shift is occurring in African countries. These nations have come to realize that relying on the export of commodities is an unsustainable and dependent path. In response, since 2000, African governments have implemented bans on exporting raw materials in an effort to reduce the reliance on western-controlled markets. They have also taken tangible steps towards adding value to their mineral, agricultural, and forest resources, with the goal of internal development. This sentiment was echoed by Robert Mugabe, the late President of Zimbabwe, in his speech to the Southern Africa Development Community (SADC) in 2015, stating, "If we continue to export raw materials, we will never prosper while other economies thrive. SADC exports ten percent to Europe, while Asian countries export 27%. Industrialization is now imperative." (News24.com, 2015). Five years later, Ghanaian President Nana Akufo-Addo declared to the Swiss that Ghana would no longer export cocoa in its raw form. He emphasized, "There can be no long-term prosperity for the people of Ghana if we continue to rely on the production and export of raw materials." (N.A.D. Akufo-Addo, 2020).

In recent years, there has been a shift in Africa's manufacturing industry towards producing finished products, rather than simply processing ore into concentrate. For instance, *Okapi Mobile* - a brand of smartphones created by Jean Mongu Bele, a Congolese resident in Boston - has emerged in 2019 as a prime example of this trend. This brand draws inspiration from African roots, featuring the Okapi, a unique animal native to Congo, and aims to not only produce smartphones but also promote a sense of pride in Africa and contribute to the continent's progress in production and technology. In addition to technological advancements, *Okapi Mobile* also plays a significant role in creating

employment opportunities in the Democratic Republic of Congo (DRC) and other parts of Africa. *Okapi Mobile* is revolutionizing the design and user experience industry in Africa by conducting their research and activities within the continent itself. This is breaking away from the traditional model of relying on America, Europe, or China for these processes. The company's main objective is to export fully developed products, thus contributing to the technological advancement of Africa. This is a new trend that is gaining momentum, with more companies focusing on manufacturing and assembly within African countries, ultimately contributing to the continent's economic growth (Okapi Mobile, 2020). Okapi Mobile is considered a trailblazer in this movement, alongside other African companies such as the Dubai-based Mara Group, which successfully launched the Mara Phone in Rwanda and later in Angola.

The advancement of Africa's technology industry extends beyond mobile phones, with a growing focus on **nanotechnology** and **semiconductors**. While Chinese competition led to the closure of South African firm SAMES' manufacturing plant in 2009, Kenya recently made significant strides in this field with the launch of Semiconductor Technologies Limited (STL) in 2021. Through a public-private partnership, STL aims to produce integrated circuits, sensors, and other nanotechnology products, aligning with Kenya's "Buy Kenya, Build Kenya" initiative to drive the nation's industrialization efforts.

The **solar panel** manufacturing sector is also gaining momentum in West Africa. In 2016, Francis Boateng founded the first solar panel manufacturing factory in Ghana, which has now grown to produce 150 MW of solar panels. Other local producers include ARTsolar in South Africa and Solinc East Africa in Kenya. In 2020, Burkina Faso entered the market with its 30 MW solar panel production and assembly plant in the Kossodo industrial zone.

There is a significant movement towards value addition in Africa, breaking away from the traditional practice of exporting raw materials. The continent is positioning itself as a global manufacturing hub, aiming to add value to its vast natural resources.

2.2 MAPPING AFRICA'S NATURAL RESOURCES

Africa is a continent known for its vast reserves of minerals, with almost half of the world's gold and one-third of all minerals located within its borders. These precious resources have played a significant role in global mineral production, with Africa generating

nearly 1 billion tons of minerals valued at USD 406 billion in 2019. According to the United Nations, this region holds around 30% of the world's mineral reserves, 12% of global oil reserves, and 8% of natural gas reserves. It boasts a large share of the world's gold, chromium, and platinum, with estimates stating that Africa holds 40% of the world's gold and up to 90% of the world's chromium and platinum. This makes the continent a key player in the global supply chain, with one product in particular, the mobile phone, showcasing Africa's pivotal role. In 2021, over 1.5 billion smartphones were sold globally, with more than half of the components, such as electronics, display, battery, and speakers, originating from minerals extracted in Africa. The Democratic Republic of Congo is a major producer of cobalt, accounting for approximately 63% of global production in 2019. Additionally, a vital metal used in the production of electronic devices is tantalum. The Democratic Republic of Congo (DRC) and Rwanda are the main sources of this metal, providing approximately half of the global supply (Al Jazeera, 2022).

Figure 27. The most abundant resource for each African country per ton of production (Source: Al Jazeera, 2022).

South Africa stands out as the top earner from its mineral resources, generating an annual revenue of $125 billion. Following closely, Nigeria secures the second position with $53 billion, trailed by Algeria at $39 billion, Angola at $32 billion, and Libya at $27 billion. These five nations collectively contribute over two-thirds of the continent's mineral wealth.

According to The World Mining Congress in 2021, Asia emerged as the leading producer, contributing 59% of the total production valued at $1.8 trillion. North America claimed the second spot with 16%, while Europe followed with 7%. Africa's mineral production accounted for approximately 5.5% of the world's total, translating to a value of about $406 billion (Al Jazeera, 2022).

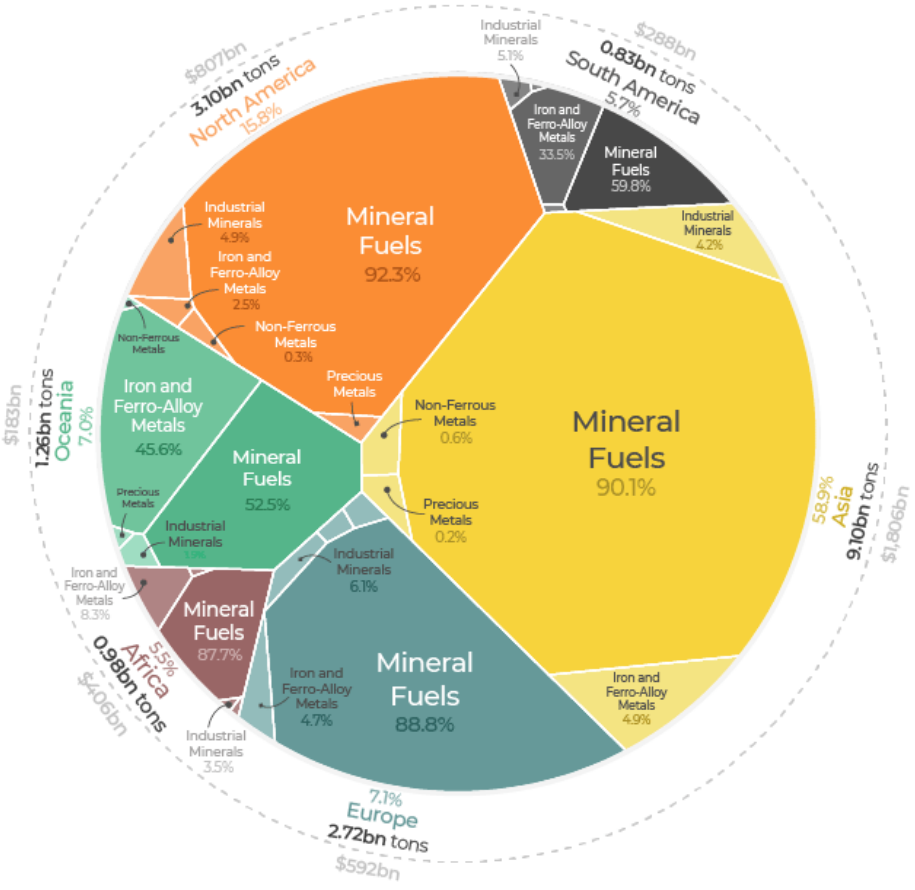

Figure 28. World mineral production (Source: Al Jazeera, 2022).

2.3 AFRICA'S MAIN CRMs: COBALT, LITHIUM, CHROME IRON AND STEEL

Zimbabwe and the Democratic Republic of Congo (DRC) are key players in providing essential minerals for the national security and economy of the EU and US. These minerals, known as Critical Raw Materials (CRM), include cobalt, lithium, chrome, iron, and steel. However, due to de facto sanctions imposed by the US and its allies, Zimbabwe can currently only receive funding from China. Meanwhile, the DRC is working towards becoming self-sufficient in producing materials required for lithium-ion battery manufacturing. These developments highlight the crucial role of these African countries in the global supply chain of essential minerals.

2.3.1 COBALT

A key mineral classified as a Critical Raw Material is **cobalt**. This magnetic metal has the potential to replace platinum, a more expensive option commonly used in cathodes for modern batteries and fuel cells. With the EU's shift towards renewable energy, there has been a rise in demand for batteries for electric vehicles and energy storage. By 2030, the need for cobalt is expected to triple under a baseline climate scenario, while by 2050, the demand could increase by five to fifteen times. One concerning factor for cobalt is its supply risks. Various African nations play a significant role in the global supply of cobalt, with the Democratic Republic of Congo (DRC) alone providing 58% of the world's cobalt. While Zambia (3.5%) and Madagascar (2.1%) are the next biggest suppliers in Africa, their combined contribution is still ten times less than that of the DRC.

Figure 29. African countries international supply of cobalt (Source: Mancini, Eslava, Traverso, Mathieux, 2021).

The Democratic Republic of Congo (DRC) faces significant obstacles in ensuring a reliable supply of cobalt, a vital global mineral. The country's **weak governance** is a major concern, posing potential challenges for the secure transportation of cobalt to other regions. Similarly, countries like Chad, Libya, and Sudan also encounter risks due to inadequate regulatory practices, lack of effective legal frameworks, and widespread corruption. These issues create an environment where the extraction and trade of cobalt may be susceptible to disruptions.

In addition to supply and governance concerns, mining cobalt also carries significant environmental risks, including water contamination, erosion, deforestation, and habitat fragmentation. These negative impacts result from both direct mining activities and the related development of transport and settlement infrastructure. In the DRC, cobalt and copper mines are concentrated in the Katanga Province's copper belt, located along the country's southern border with Zambia. These minerals are commonly found in close proximity to each other. While mining activities have contributed to economic growth, they have also had a detrimental effect on the DRC's natural resources and local environment, leading to periodic environmental crises.

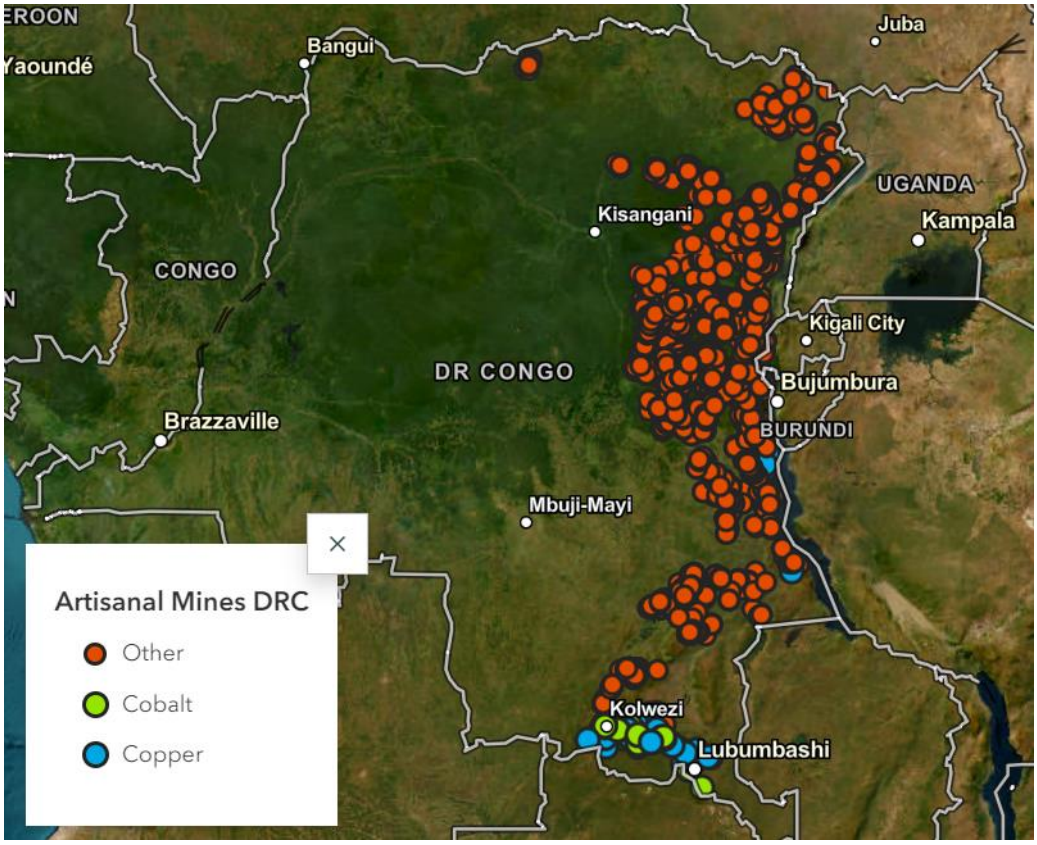

Figure 30. Mines in the DRC (Source: Mancini, Eslava, Traverso, Mathieux, 2021).

The population density in this region has increased significantly since 1975, as more people have migrated closer to the economic opportunities provided by mining activities. Along with humans, infrastructures like roads began to appear, drastically altering the landscape. Deforestation has become widespread, as original African forests are cleared to make way for mines, roads, and towns. This is particularly evident in the Katanga Province's copper belt, where cobalt and copper are primarily extracted.

Mining for cobalt in the DRC also brings about significant social risks. A recent study, commissioned by the European Commission, examined the overall risks associated with cobalt extraction from small and artisanal mines near the town of Kolwezi. The study documented severe and systemic violations of land, human rights, and child labor. Miners are subjected to harsh working conditions, often having to spend hours in water or in hazardous situations. Corruption, bribery, tax evasion, and misdeclaration of materials also pose threats to mining activities, but as they are perceived as the main source of economic opportunities for local citizens, the risks faced by the populations often take a backseat (Mancini, Eslava, Traverso, Mathieux, 2021).

In the year 2021, the Democratic Republic of Congo (DRC) made the decision to prohibit the export of copper and cobalt concentrate due to its small contribution of only 3% to the battery and electric vehicle industry. With the electric vehicle market projected to reach a value of USD$7 trillion by 2030 and USD$46 trillion by 2050, DRC's Deputy Prime Minister Eve Bazaiba expressed concerns at COP26 in Glasgow about the country's limited involvement in the green vehicle value chain. She emphasized that DRC must not only export raw materials, but also have the opportunity to transform and manufacture them into batteries within the country. This statement was made in response to the exploitation of thousands of cobalt miners who work as modern-day slaves in hazardous conditions. These miners supply cobalt to only one corporation, Congo DongFang International Mining, which is a subsidiary of the Chinese cobalt giant Zhejiang Huayou Cobalt. This company provides cobalt to the world's largest lithium-ion battery manufacturers (Hunters, 2022).

To address this issue, a report from BloombergNEF in 2021 recommended establishing precursor **material manufacturing** plants in Africa as a temporary solution. This would involve producing battery furnaces, turbines, and photovoltaic cells to generate electricity within the continent. Nechan Naicker, a South African entrepreneur, has already

taken action by starting **Megabillion Energy Company**, the first major producer of lithium-ion batteries in Africa. Instead of solely exporting raw materials, Naicker aims to promote value-added production within the continent and cater to the domestic market, utilizing the region's own resources instead of relying on colonial infrastructure that have facilitated the export of Africa's raw materials to the EU and US.

However, it is crucial to form partnerships with key supplying countries in order to achieve successful raw material diplomacy. The transition to a low-carbon digital future relies on effectively negotiating trade agreements and addressing any trade imbalances.

2.3.2 LITHIUM

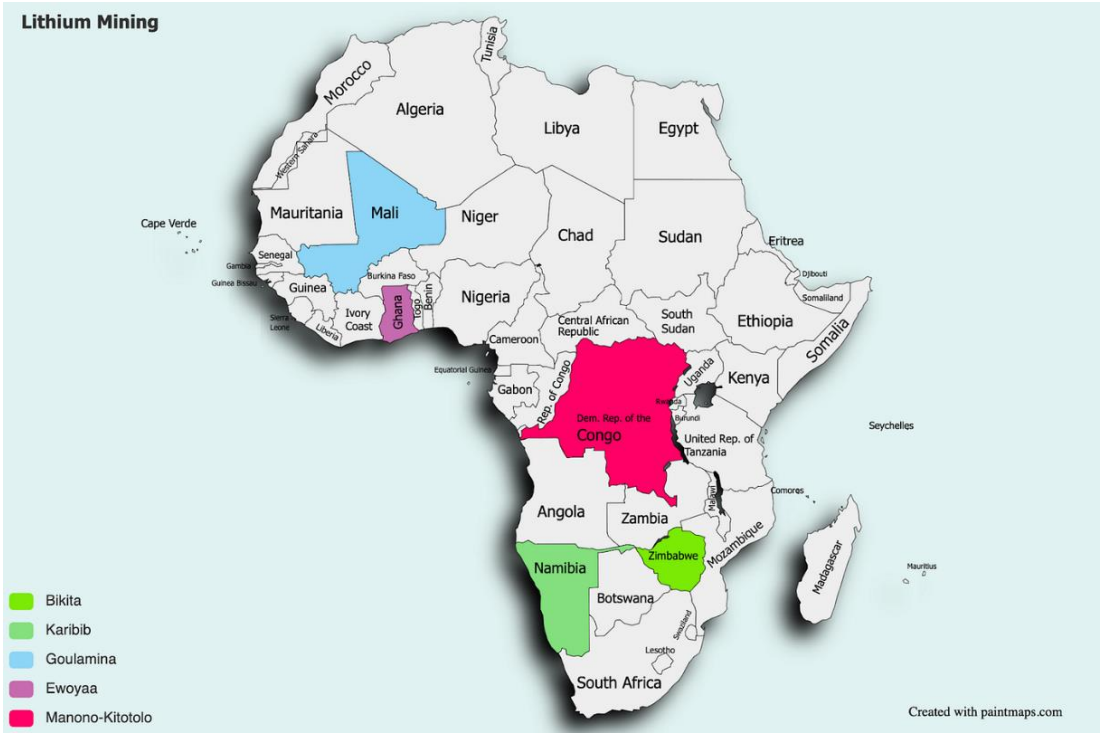

Figure 31. The prospect of lithium mining in Africa (Source: Robertson, 2023).

With the urgent need to address the global climate crisis, there is a growing demand for renewable energy technology, particularly in the Northern hemisphere. This includes electric vehicles and the batteries needed to power them, for which lithium (often referred to as "white gold") is a crucial commodity. Interestingly, Africa is rich in lithium resources. Currently, **Australia, Chile**, and **China** dominate the global lithium market, accounting for 90%

of the 130,000 tons produced in 2022. However, as demand is expected to increase sixfold by 2035, this dynamic is likely to change. Other sources of lithium have been discovered in countries like Zimbabwe, Namibia, Ghana, the Democratic Republic of Congo (DRC), Mali, and Ethiopia, with the top producers currently being Zimbabwe, Namibia, and DRC (Robertson, 2023).

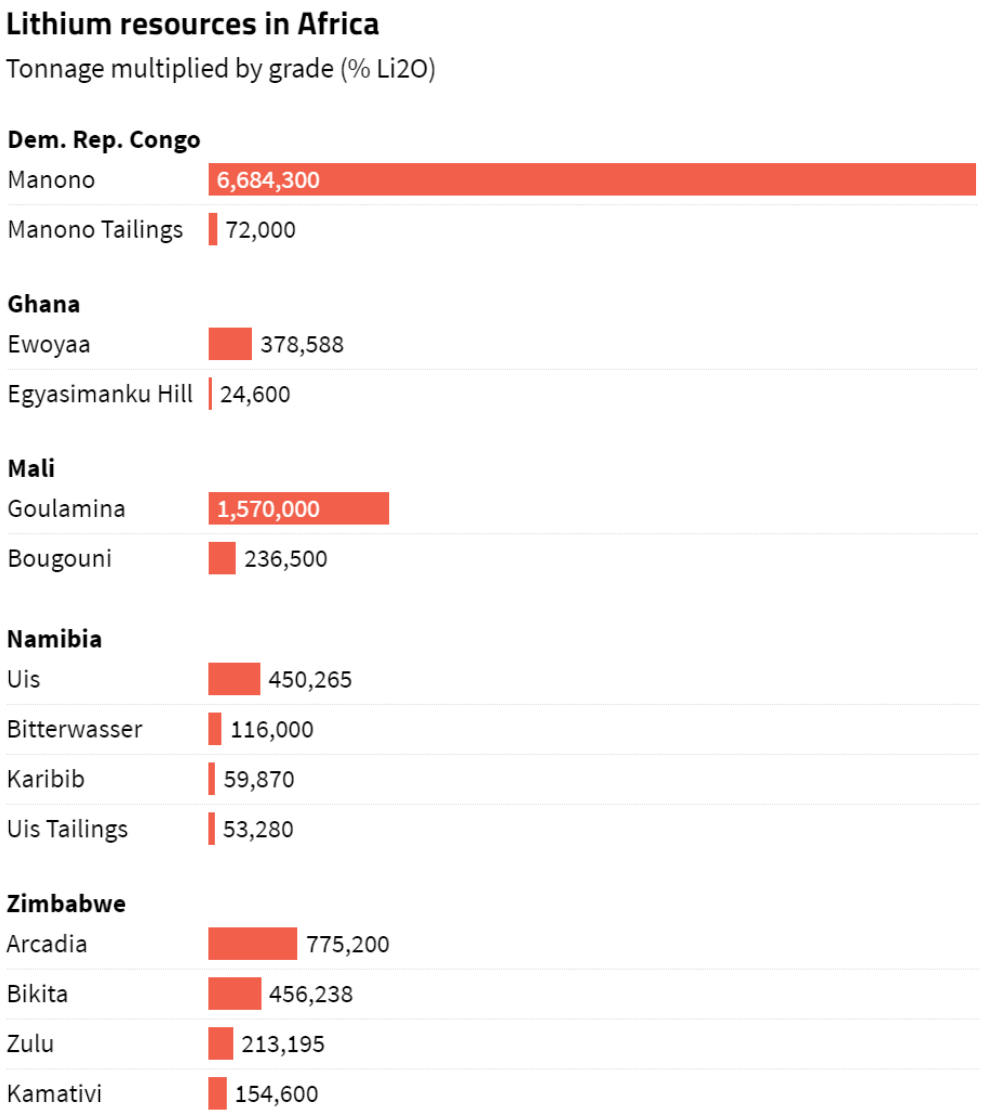

Figure 32. Lithium resources in Africa (Source: Robertson, 2023).

Several Chinese companies have made significant investments in **Zimbabwe** due to the abundance of lithium resources. As with the DRC, weak governance in Zimbabwe has also played a crucial role in shaping the management of mineral mining. However, due to issues such as corruption and human rights violations, both the EU and US have strained

relationships with Zimbabwe's President Robert Mugabe. As a result, several state-owned companies and individuals connected to the government have been placed on their sanctions lists (Official Journal of the European Union, 2011).

A well-known location for lithium extraction in Zimbabwe is the **Sandawana mine**, known for its emeralds since the mid-20th century (Schlesinger, 2020). However, the emerald mining industry collapsed in 2010. The discovery of lithium deposits in the same area in 2022 fueled a "lithium rush," with over 5,000 artisanal miners from across the continent flocking to the region to extract the mineral and sell it to buyers in South Africa. The working conditions for these miners were far from satisfactory (Chisu Gwata, 2017).

The influx of artisanal miners caught the attention of the Zimbabwean political elite, who saw an opportunity to gain control over the lucrative Sandawana mine. Through the **Zimbabwe Miners Federation (ZMF),** a body created to work with artisanal miners, they obtained a lease over the mine. However, only miners who paid to join the federation were allowed to work at Sandawana. This deal was seen as a "once in a lifetime opportunity" by the ZMF. Unfortunately, the involvement of the ZMF raises concerns about corruption, as its president, **Henrietta Rushwaya**, is the niece of Zimbabwe's President Emmerson Mnangagwa, and has been accused of participating in corrupt and illegal activities in the country's gold industry. While the ZMF claims to be working towards improving the working conditions of miners, workers have reported a 75% drop in the price they receive for their minerals since the involvement of the ZMF (Robertson, 2023).

The Sandawana case not only involves Henrietta Rushwaya, but also Kudakwashe Tagwirei, known as "Queen Bee" by the Financial Times. Tagwirei, who is believed to have strong ties with President Mnangagwa's ruling party, acquired the Sandawana mines in 2020 and established a new public-private partnership called Kuvimba Mining House (which denies any association with Tagwirei). This conglomerate, which operates in six sectors including gold, lithium, and chrome, holds significant influence over mining operations throughout Zimbabwe.

In December 2022, the Zimbabwean government issued an edict stating that "no lithium-bearing ores shall be exported from Zimbabwe to another country" in order to promote domestic industrialization. However, it was later revealed that Zimbabwe Defense Industries (ZDI), a company with close ties to the country's military and subject to sanctions

from the US and EU, had been given special permission to export lithium ore to China from a mine in Masvingo.

Namibia holds a significant amount of lithium resources, but its past has been overshadowed by issues of corruption and inadequate governance. In addition to unlawful practices, it is worth noting that Namibia was the inaugural African nation to enter into a critical raw materials partnership with the EU (Robertson, 2023). In recent times, numerous countries have attempted to gain access to Namibia's lithium reserves.

China has also expressed interest in Namibia's mines. Through its subsidiary **Xinfeng Investments**, Chinese company Tangshan Xinfeng Lithium Industry has entered into a partnership with a subsidiary of battery giant CATL, which supplies batteries to well-known brands such as BMW, VW, Ford, and Tesla. Furthermore, it has acquired Namibian company **Orange River Mining** in order to exploit its lithium mines. However, there are accusations that Xinfeng obtained one of its mining licenses through fraudulent means and bribery. They reportedly requested permits for small mining sites while already working on a large lithium deposit that could meet the demands of industrial-scale projects (Robertson, 2023). Another company involved in the exploitation of Namibia's lithium is **Long Fire**, whose director is also a shareholder in Xinfeng Investments. This has disappointed the hopes of the local population who were expecting the development of job opportunities and economic growth in the region. In 2022, Xinfeng was granted a special exemption to export 55 thousand tons of unprocessed ore to China within a short period of two weeks, despite the objections of the Namibian Mines Minister. Xinfeng claimed that the material needed to be exported for at least three years in order to conduct tests and establish processing plants within Namibia (Robertson, 2023). In June 2023, Namibia eventually implemented a **ban** on the export of raw lithium. However, one of the country's ministers mentioned that limited quantities of minerals may still be allowed for export at the discretion of the Minister of Mines and Energy, indicating the possibility of future illegal activities.

Although Namibia appears to be in a favorable position to benefit from the demand for green minerals, the Xinfeng situation underscores that there is no assurance that this transition will positively impact the well-being of the country's citizens.

Zimbabwe and Namibia possess considerable amounts of lithium, but many experts believe that the **Democratic Republic of Congo** has the largest deposit in the world. The

people of DRC hold the expectation that the estimated 6.6 million tons of lithium in the vicinity of the isolated town of Manono could bring about a significant improvement in the country's economy and position it as a leader in the green energy movement. However, this opportunity is being jeopardized by foreign investors.

The major players in the mining industry in DRC include Australian-listed **AVZ Minerals** and Chinese conglomerate **Zijin Mining**. In 2017, AVZ secured a majority stake in the Manono project, with a controlling 60% ownership. Other parties interested in purchasing shares in the project include the Congolese state-owned company COMINIERE (30%) and Dathomir Mining Resources (10%). AVZ has also entered into agreements with Zhejiang Huayou Cobalt, CATH, and a subsidiary of the Chinese battery giant CATL, all major players in the battery metals sector.

In an unexpected turn of events, COMINIERE agreed to sell 15% of its shares to rival company Zijin in 2021, calling into question AVZ's majority control over the project. An investigation conducted by DRC's state anti-corruption body uncovered that Zijin had paid significantly less than the market value for COMINIERE's shares, and that the acquisition of shares from AVZ had resulted in generating up to $28 million for obscure shell companies controlled by questionable dealmakers. Additionally, some sources allege that Zijin, Dathomir, and COMINIERE have worked together to undermine AVZ and delay the progress of the Manono Project in order to take control of it (Robertson, 2023).

Also in this case, poor governance and corruption have all seemingly played a role in the stalling of the project. Meanwhile, the population of Manono are still waiting for lithium to bring them some tangible benefits.

2.3.3 CHROME IRON AND STEEL

In an attempt to boost local value addition, Zimbabwe has implemented a ban in 2021 on the export of raw chrome ore, followed by a ban on chrome concentrates. The region is home to 22 privately-owned smelters and holds the world's second-largest reserves of high-grade chromium ore, accounting for 12% of the global total. It produces 1 million tons of chrome annually, with 25% of this production serving the domestic ferrochrome industry and the remaining amount being primarily exported to China.

The sector is dominated by **Tsingshan Holding Group** (China), the world's biggest stainless-steel company, and its subsidiary **Zhejiang Dinson Holding Co., Ltd**., which is building new plant in Kwekwe and Zimbabwe. Other key smelters which will benefit from the ban are Dinson's smelters and Zimasco (Stibbs, 2021). Dinson is also building the giant steel manufacturing plant *Manhize* in Mvuma, second in output size only to ArcelorMittal and Al Ezz Dekheila Steel, respectively in South Africa and Egypt, and equal to Tembo Steels in Uganda.

Figure 33. Furnaces being delivered at Manhize, June 2022 (Source: Stibbs, 2021).

The plant comes decades after the country's steel plant ZiscoSteel stopped production, making the country an importer of all steel and iron products reaching US$400 million in 2021. Manhize will open with 5 furnaces producing 1.2 million tons per year of pig iron and carbon steel, rising to 12 furnaces producing 2.4 tons per year when complete.

2.4 THE TRANSITION TO RENEWABLE ENERGIES: THE KEY ROLE OF AFRICA

Transitioning to a low-emission and digital future requires a sustainable supply of critical raw materials for renewable energy and digital technologies. Therefore, it is important to understand which raw materials are essential for future development, where are they sourced from, which ones are critical and potentially at risk of discontinued supply, how can raw materials be extracted responsibly.

The utilization of renewable energy sources is on the rise in Africa, along with other regions. Presently, 23 African countries have committed to reaching specific benchmarks for

integrating renewable energy into their overall energy consumption by the year 2030. This initiative is being led by Namibia, Rwanda, and Niger, which have set ambitious objectives (Pappis et al., 2019). To meet these targets, batteries, electric motors, wind turbines, printed circuit boards, integrated circuits, and capacitors play a crucial role in providing energy and promoting a digital future. However, the availability of these commodities is vital for the success of these emerging technologies (Buschke and Estreguil, 2021).

The implementation of new technologies in strategic economic sectors is heavily reliant on the use of raw materials. The significance of these materials can be determined by their role in the modern economy, as well as their demand and economic value. This ultimately impacts their availability and pricing in the market.

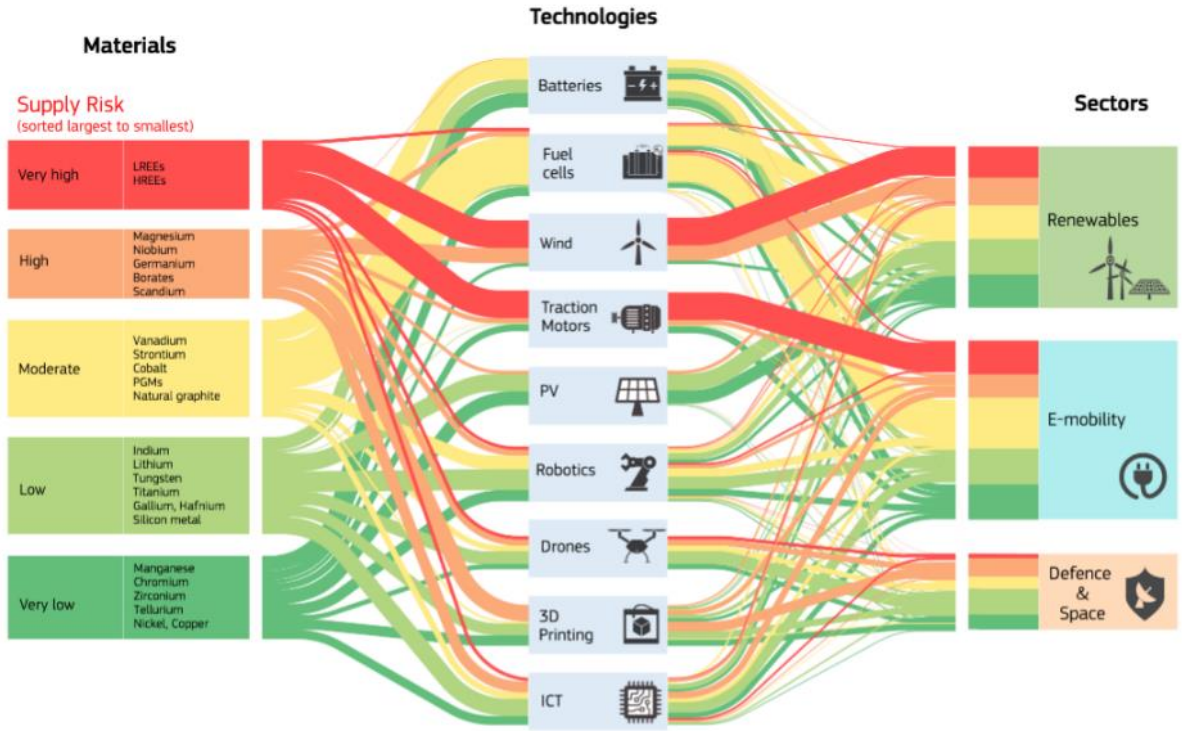

Figure 34. Critical Raw Materials for Strategic Technologies and Sectors in the EU.

Clean energy industries, such as renewable energy and e-mobility, heavily rely on fuel cells for generating clean electricity and batteries for energy storage. The production and functioning of fuel cells require important commodities like cobalt, titanium, and platinum, while modern lithium-ion batteries depend on a steady supply of cobalt, lithium, copper, and other materials. The availability of these commodities is determined by various factors,

including extraction difficulties, potential for recycling, options for substitution, and geographical distribution.

There is potential for countries with large populations and economies, such as African regions, to take advantage of the growing trend of raw material recycling. Setting up e-waste recycling infrastructure could lead to economic growth and job opportunities, while also addressing the environmental, social, and health hazards linked to resource extraction. However, this can only be achieved with proper national policies regulating the collection and recycling of e-waste, in order to avoid potential social and environmental risks (Buschke and Estreguil, 2021).

Figure 35. African countries with and without E-waste regulation (Source: Buschke and Estreguil, 2021).

According to a report by the United Nations University, most African countries lacked specific national regulations regarding e-waste in the year 2020. Some of the countries that have implemented dedicated policies include Cameroon, Egypt, Ghana, Kenya, Ivory Coast, Madagascar, Nigeria, Rwanda, South Africa, Tanzania, Uganda, and Zambia.

The demand for secondary raw materials is increasing worldwide, but there is still room for further development in this area. As the availability of secondary sources may not

be enough to meet the rising demand, it is important to prioritize responsible sourcing of critical raw materials.

Chapter 3

CHINESE INTERESTS IN AFRICA

3.1 CHINA-AFRICA HISTORICAL RELATIONS

The relationship between China and Africa dates back to the end of the Chinese civil war in 1947, when China began engaging with Africa as part of its foreign policy. China supported several African liberation movements and has continued to prioritize diplomatic relations with African countries. In fact, every year since 1950, the foreign minister of the People's Republic of China (PRC) has made visits to African countries. In the past ten years alone, visits have been made by foreign ministers Qin Gang and Wang Yi, as well as premier Xi Jinping. According to Qin Gang, the former foreign minister, China's relations with Africa serve as the foundation of its foreign policy. In 1971, Africa's support in recognizing the PRC as the official representative of China marked a significant moment in the history of the Chinese-African relationship. Currently, Eswatini is the only African nation that recognizes Taiwan's government (Vines and Wallace, 2023).

The Chinese ***Going Out*** strategy, initiated in 1999, promoted Chinese businesses to invest abroad and contribute to the growth of their national economy. This had a positive impact on Chinese companies, as well as on society, where the unemployment rate significantly decreased. In order to strengthen and improve cooperation between China and Africa, the **Forum for China-Africa Cooperation (FOCAC)** was established in 2003. The first summit took place in Beijing in November, and subsequent summits have been held every three years.

In 2013, the **Belt and Road Initiative (BRI)** was launched by Xi Jinping, which included several East African regions. Originally targeting East Africa, the BRI quickly expanded as many African countries saw potential opportunities. This initiative involved significant investments by China in infrastructure projects across Asia and Africa, which created a high demand for Critical Raw Materials (CRMs) mainly from Africa. The peak of investments was seen in 2016, followed by a sharp decline in 2020. This shift can be attributed to changes in priorities within Chinese domestic politics and challenges faced by African countries in repaying loans (Vines, Butler, and Jie, 2022).

3.1.1 FORUM ON CHINA AFRICA COOPERATION (FOCAC)

In 2009, the first Forum on China-Africa Cooperation (FOCAC) was held with the participation of China and 54 African member states, with the aim of improving political, trade, and investment relations. Africa has played a significant role as a source of commodities for China, providing access to resources for internal growth and creating new markets for Chinese businesses.

In order to secure access to regions rich in raw materials, China offered a competitive package of incentives to African nations, competing with Western countries. As a demonstration of its commitment to this goal, China cancelled the debt owed by 31 African states. FOCAC not only strengthened China's relationships with many African countries, but also highlighted its dedication to mutually beneficial partnerships focused on trade and investment, without interfering in internal political affairs. This approach has been seen by Western nations as a way for China to avoid criticisms from African leaders regarding its investments and internal policies, allowing China to mitigate the risk of internal crises or revolutions.

Figure 36. Xi Jinping at FOCAC 2018 (Source: FOCAC 2018).

The initial Forum on China-Africa Cooperation sparked a notable surge in Chinese presence in Africa. However, a closer look at trade dynamics between the two continents reveals an uneven distribution of benefits, with only a handful of nations reaping the advantages. The main export destinations for China are concentrated in countries such as South Africa, Nigeria, Egypt, and Algeria, while imports are primarily sourced from South

Africa, Angola, Libya, and the Democratic Republic of Congo (DRC). Interestingly, some African countries actually face trade deficits with China, as their exports may be outweighed by imports. Altogether, trade between China and Africa exceeded $254.3 billion in 2021 (Bommino, 2022). Infrastructure investments have been a key topic of discussion during the Forum. From 2007 to 2020, Chinese banks surpassed Western banks in providing loans, with over $23 million compared to €9.1 million. This highlights China's significant role in financing and promoting infrastructure projects in Africa.

3.2 THE CHINESE APPROACH

The reasons behind China's success in Africa can be attributed to two primary factors: first, China's history as a non-colonizing country; and second, its policy of non-interference in the internal affairs of the countries it invests in (Bommino, 2022).

In recent times, some have accused China of practicing a form of **neocolonialism** through its involvement in Africa. Neocolonialism refers to the subtle control exerted by powerful nations, using economic, cultural, and political influence to exploit the resources and labor of other countries for their own benefit. This often involves making financial agreements or causing debt-traps, resulting in increased dependence on the dominating country (Vinicius de Freitas, 2023). China's involvement in Africa has faced criticism for allegedly seeking to secure access to resources, trade advantages, and military alliances or bases. However, China argues that its intentions are not focused on monopolizing land or economic opportunities, emphasizing that its involvement aims to promote mutual prosperity and development (Qin, 2023).

The presence of Beijing in Africa has had both positive and negative effects. On one hand, China has played a crucial role in constructing vital infrastructure, contributing to the production of goods and services. Additionally, Chinese investments have expanded its soft power, diplomatic influence, and infrastructure projects on the continent, creating more job opportunities. However, China maintains that it does not impose its governance model on African nations, allowing them to maintain their political independence despite their close relationship with China.

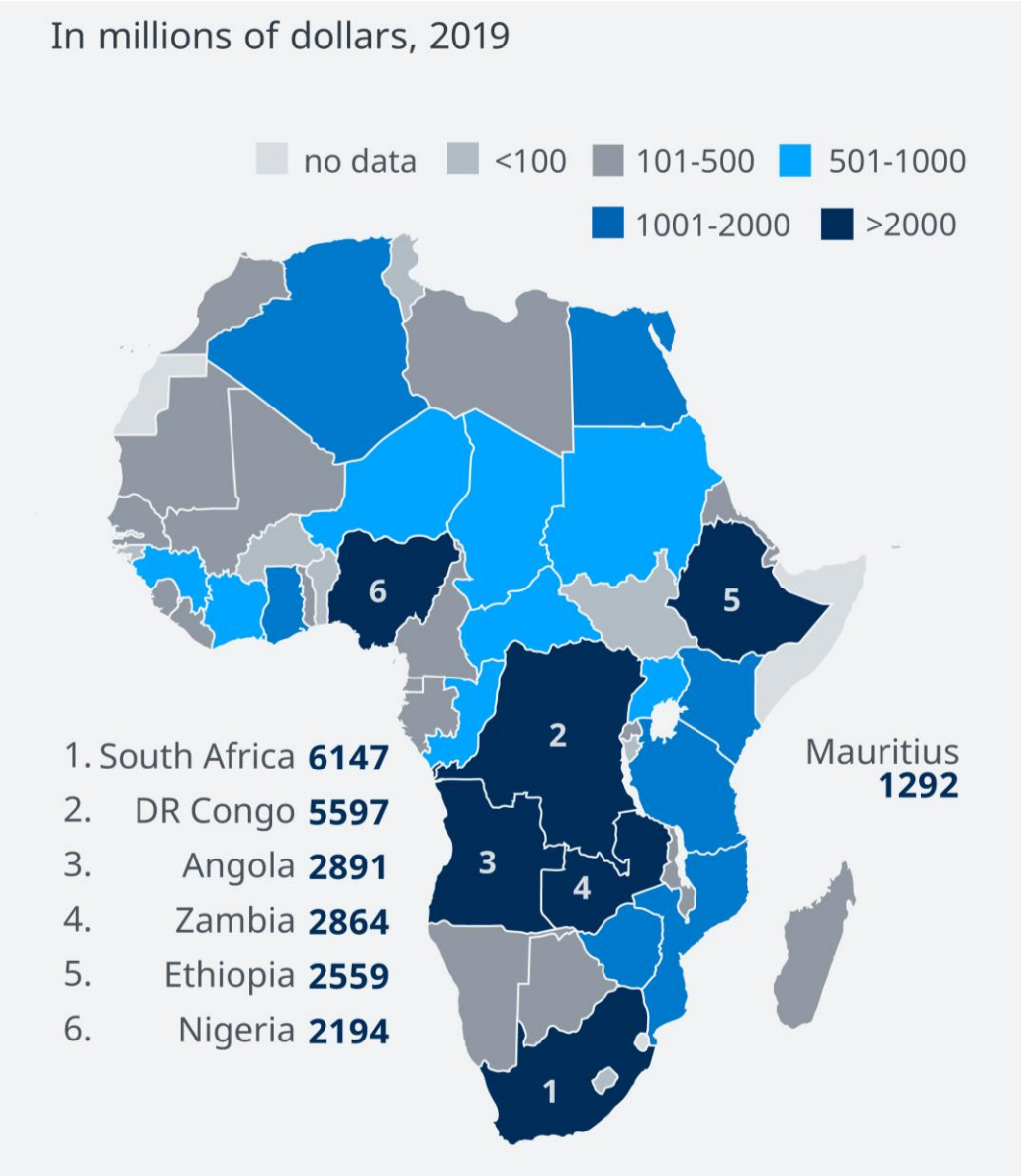

Figure 37. China Foreign Direct Investments in Africa (Source: IEA 2023).

China has become Africa's biggest trading partner, exceeding $282 billion in 2022. Over the years, 25 economic and trade cooperation zones have been established in 16 African countries, with a total investment of $7.35 billion. These zones have been instrumental in promoting local industrialization in key sectors such as natural resources, agriculture, manufacturing, trade, and logistics. Notably, a large portion of Chinese businesses in Africa have been involved in manufacturing (30%), while others have participated in services, trade, construction, and real estate.

China's approach in Africa is distinct from that of Western nations, specifically in terms of exerting political influence over the internal affairs of African nations. While Western countries have traditionally held significant political influence in African diplomacy, China's involvement has been primarily focused on economic and trade cooperation, aiding the continent's economic growth in various sectors. Nonetheless, as China's presence in Africa continues to expand, there are ongoing concerns about its involvement and influence on the continent.

3.2.1 CHINA'S UNITED FRONT STRATEGY

China is utilizing diplomatic strategies to establish beneficial partnerships with multiple African countries, but this approach differs when it comes to Western countries. **The United Front (tǒngyī zhànxiàn; 统一战线)** is a political tactic employed by the Chinese Communist Party (CCP) to create networks of influential individuals and organizations who are aligned with the CCP's interests. The primary goal of the United Front is to safeguard the CCP's domestic stability and elevate China to a position of global military and economic power. In Africa, these networks consist of individuals and groups who actively support and defend China's objectives, while marginalizing any opposition. The United Front targets key players such as business leaders, intellectuals, non-governmental organizations, media outlets, academia, political parties, youth and women's groups, entrepreneurs, and former heads of state. To avoid detection, many United Front organizations maintain indirect ties to the CCP. It is argued that Africa poses the most fertile ground for China's influence and appeal, as it is here that Chinese perspectives, policies, and experiences are most readily embraced (Nantulya, 2023).

The Chinese Communist Party (CCP) strategically focuses on building and maintaining relationships with elites and their allies outside of government in order to solidify their power. As a result, African leaders who are aligned with the CCP are often highly defensive of Chinese interests and critical of those who oppose them. This deepening of support and influence within the region reinforces China's legitimacy and devalues their adversaries. The United Front shows particular effectiveness in Africa, as it allows the CCP to gain support and credibility through indirect means, avoiding direct ties to the party.

One of the key goals of these groups is to influence popular opinion. By strengthening relationships with African schools, think tanks, cultural organizations, and media platforms, the CCP endeavors to promote a positive image of China while also countering what it perceives as Western bias against the country. Critics argue that such actions risk compromising the integrity of media and academic institutions, potentially influencing public understanding and interpretations of news and significant developments (Africa Center for Strategic Studies , 2023).

The United Front coordinates hundreds of thousands of individuals and organizations to expand China's circle of "friends" and divide "enemies". it exists to ensure that the CCP's power is not undermined. Among its core tasks, one is combating what the CCP calls "false ideological trends" like liberal constitutional democracy, Western political values, promotion of civil society, neoliberalism, historical nihilism, Western concepts of journalism, and the questioning of China's political system. These were identified in a seminal document, "Communique of the Current State of Ideological Sphere," in 2013, a year after Xi Jinping took the helm. The United Front Work Department (UFWD) and Chinese People's Political Consultative Conference (CPPCC) are the two principal organs that have historically been affiliated with the United Front.

During the Covid-19 pandemic, the United Front was evident in action when China provided its vaccine to numerous African nations. However, there were disparities in the distribution, with some regions receiving the vaccine earlier than others. To justify this, China's media outlets in Africa pushed a narrative praising the country's efforts in closing the "shocking vaccination gap" and casting doubt on the safety of Western vaccines. However, by mid-2022, it was reported that over 90% of the 2.4 billion vaccines provided by COVAX, the international initiative aimed at ensuring vaccine access in low- and middle-income countries, were from Western nations. Despite this, China's United Front relies on creating false impressions and assumptions rather than factual evidence. Presently, there is a widespread belief in Africa that China has supplied more vaccines to the continent than any other country (P. Nantulya, 2023).

The CCP's ability to influence information ecosystems is essential to its efforts on the United Front. The China Africa Press Center offers eighteen-month scholarships to African journalists working at various Chinese institutions each year. The largest Chinese news channel overseas, China Global Television Network (CGTN), situated in Nairobi, reports that

1.800 pieces are produced each month by 150 Kenyan journalists. But many Chinese corruption scandals surfaced, and some of the journalists Beijing trained with its scholarship program revealed the truth of the facts in their pieces.

Figure 38. Students in Senegal watch satellite television provided by Chinese media company StarTimes (Source: AFP).

The second-biggest supplier of digital television in Africa is StarTimes. It contains content from a number of Chinese media sites, including China Radio International, China Daily, and China Global Television Network (CGTN). Every day, these sites publish content about Africa, some of it in regional tongues. The United Front frequently uses StarTimes to promote a favorable picture of China. In regions of Africa with well-established China-Africa links, the United Front can wield considerable influence. It becomes especially strong in areas where corruption is common because it may create networks and take advantage of weaknesses in order to serve Chinese goals. Emerging best practices seek to take use of opportunities that support African interests in order to counteract the negative aspects of Chinese influence. China's complicated presence in Africa necessitates sophisticated techniques to negotiate the political, economic, and cultural terrain.

3.3 CHINESE INVESTMENTS IN AFRICA

The great amount of foreign direct investment (FDI) made by China in Africa are linked to a growing demand for **energy** and **raw materials**. Besides the quantity of commodities present in the continent, Africa is attractive also because of its underdeveloped

economy and young and growing population, which represent an opportunity for a market yet to be developed. for these reasons in the last decades China's investments in Africa have increased consistently.

Figure 39. China yearly investment and construction in Sub-Saharan Africa by country and sector (Souce: CGIT).

Between 2006 and 2020, China and Africa signed over 600 agreements valued more than $300 billion. The regions that more benefited of these investments are Nigeria, Ethiopia, Angola, Kenya, Zambia, and the Democratic Republic of Congo (DRC). Four industries account for 87% of China's building and investment in Sub-Saharan Africa: real estate (11%), metals (13%), transportation (29%), and energy (34%) (Cheraghlou Aladekob, 2023).

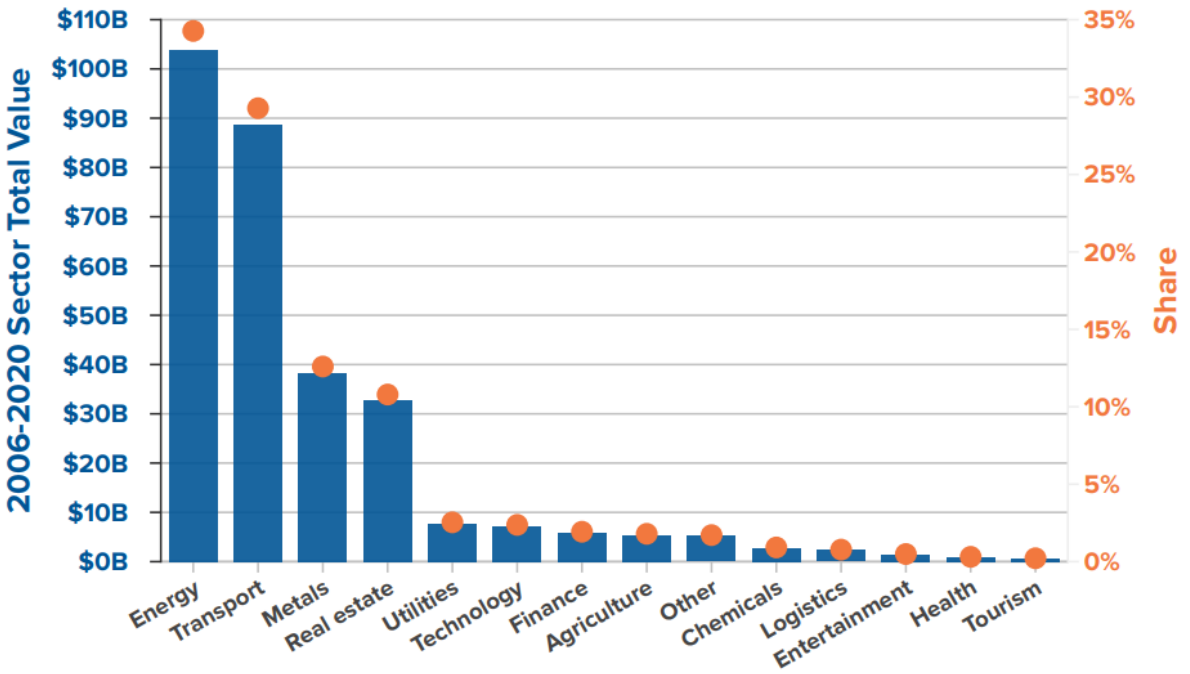

Figure 40. China yearly investment and construction in Sub-Saharan Africa by sector (Source: CGIT).

More than 67% of Chinese projects are near to the sea, primarily on the Eastern coast, as a result of the Belt and Road Initiative (BRI) and the higher value of projects located in nations with seaports. There are several reasons why projects in these places have a higher value than those in landlocked regions (the difference is around $131 billion): China needs to export both raw materials and finished goods, therefore it's critical that they are at a location that makes logistics easier; doing business is less expensive; landlocked African countries are smaller and consequently less skilled (Cheraghlou Aladekob, 2023).

China approaches Africa extremely differently from Western nations, as we have already explained. Beijing attempted to work with the local administrations to achieve mutual benefits rather than imposing its rule over them. Chinese investments themselves demonstrate that China's interest in maintaining positive relations with Africa is predicated on a stable, long-term supply of energy and minerals; in return, China makes infrastructure investments that will enhance living standards for its citizens and lower the country's unemployment rate.

Political developments are a significant component that further fortifies the ties between China and Africa. In reality, China can always count on African backing at UN or

other summits when promoting its own proposals against those put out by Western nations (Green Nelson Washington, 2020). Although Chinese communism cannot be exported from China, Beijing asserted that certain similarities separate China from many African state regulations.

China, which has close political and diplomatic relations to Africa, is currently attempting to outsmart international rivalry in order to stay and grow its influence there.

3.4 SINO-AFRICAN TRADING ACTIVITIES

Chinese influence is growing exponentially throughout Africa. The US and France continue to lead in terms of trading partners with Africa, but the China-Africa Business Council showed that China is now among the continent's most significant economic partners. China's commerce with Africa increased from $6.4 billion in 1999 to about $40 billion in 2005, and more growth is anticipated in the years to come. These connections have effects on global finance. The World Bank Group is no longer the exclusive provider of funding and technical help for development projects; other players, particularly those from China, have entered the picture and invested twice as much between 2018 and 2020 as the World Bank Group (American Enterprise Institute, 2022).

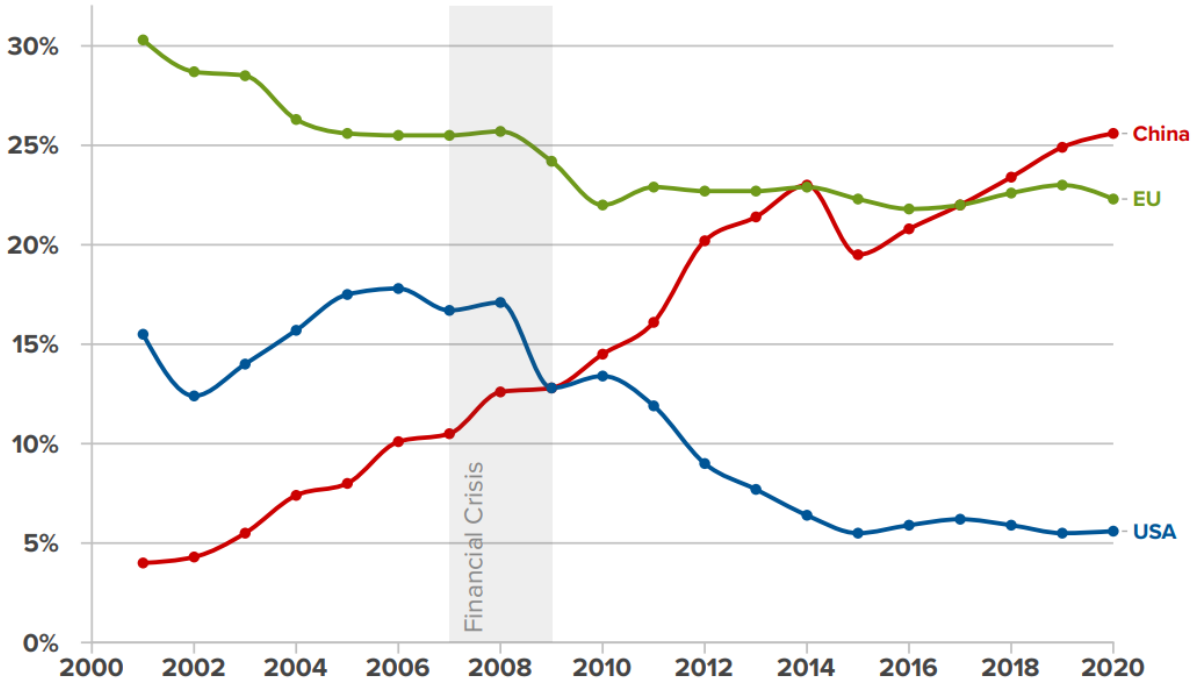

Figure 41. Share in total merchandise trade of Sub-Saharan Africa (Source: International Monetary Fund).

China ranked as the leading importer to 13 areas and the top exporter to 26 African economies in 2019. The worldwide supply system was interrupted by the COVID-19 epidemic, but trade between the two continents was largely unaffected and peaked in 2021 at $254 million. This outcome is partly due to China's assistance to Africa during the pandemic. In reality, China promised to provide Africa with vaccines as well as any kind of personal protective equipment. China's import activity also continued, helped by the existence of Chinese infrastructures on the continent, which made it easier to distribute imported supplies and goods (Nyabiage, 2022).

Chinese commerce in Africa includes a wide range of products and parts. In addition to oil, which is of primary concern to China, Beijing also wants to acquire other resources, such as **copper, bauxite, uranium, aluminum, manganese, iron ore**, and so on (Princenton, 2005). Oil, however, continues to be China's most intriguing resource.

3.4.1 CRUDE OIL

China has been consuming more oil than ever in recent years, thus Beijing needed to locate a reliable supplier of crude oil to keep it afloat (Taylor, 2006). The continent of Africa was selected due to affinities between the two continents, primarily political, in addition to the continent's large concentration of non-ferrous metals and crude oil. A China Daily reporter stated in 1998 that "African countries will have more say in international affairs as more improve political stability and make headway in economic growth." China and Africa share a common past of slavery and oppression, for this reason Africa looks at China as a model of a country that started from the ground and reached the top on its own (Zhan, 2006).

Several agreements were signed between the two continents in the first ten years of the twenty-first century: Sinopec signed a $525 million contract to develop the Zarzaitine oil field in Algeria and Gabon; CNPC paid $350 million to purchase Algerian refineries; PetroChina also signed a contract with Algeria's Hydrogen Carbide to build new refineries; PetroChina signed a $800 million agreement with a Nigerian company to guarantee the supply of 30.000 barrels of crude oil per day; Kenya has also begun to participate in recent agreements (The Standard, 2006). Together with signing agreements, the continent's

exploration activities is also picking up, creating room for new commercial opportunities that are already attracting China's and other nations' interest.

Even if we tried to explain Chinese approach in Africa, its strategy in the continent is covered with a vail of mystery. Actually, some contradictions can be found in the way China manages its projects in Africa. “Chinese businesses pay greater attention to protecting the environment when building factories and exploring for Africa’s rich reserves in oil, ore and non-ferrous metals” said Wang Yingping, member of the China Institute of International Studies (Chinafrica, 2006), but hearing the opinion of the locals this is not always true: “The Chinese just come and do it. They don’t hold meetings about environmental impact assessments, human rights, bad governance and good governance. I’m not saying it’s right, just that Chinese investment is succeeding because they don’t set high benchmarks” said the Sierra Leone Ambassador to China. Despite from the outside China is creating a good alliance with several African governments, accuses related to the lack of transparency and the total absence of respect for human rights still stand.

3.4.2 ENERGY AND MINERALS

Chinese focus on energy and the environment was emphasized during FOCAC 2021, demonstrating China's interest in African resources as well as its leadership position in global energy-climate governance. Beijing demonstrates its resolve to represent developing nations' interests in multilateral institutions by endorsing the declaration on climate change cooperation. The goal of this move is to position Beijing as the southern hemisphere's representative in the framework of global climate governance. Beijing reiterates its promise not to construct new coal-fired power plants abroad and commits to implementing clean and green energy development projects. It also calls for the inclusion of green hydrogen and gas projects in green investments and funding. This marks a turning point in the evolution of Sino-African energy ties as well as the definition of a new development model wherein green energy will play a significant role in shaping Chinese foreign policy, both inside and outside Africa.

This is clear when one considers how China's interests in the African energy sector have changed. Even if China is still interested in crude oil from Africa, particularly since the start of the Russian-Ukrainian conflict, Beijing is now more interested in gas supplies. China has the potential to take over the role of international financial organizations headed by Western nations, as Europe and the US are less inclined to support new projects in the oil and gas industry.

African resources also attracted more attention from China. About 30% of the world's mineral reserves are owned by Africa (Maraias, 2022). Some of these reserves are essential for producing energy-transition technologies, such as batteries for electric vehicles, solar panels, and wind turbines. African minerals are also used to produce some defense technologies. About 70% of the world's cobalt is produced in the Democratic Republic of the Congo; the largest manganese reserves are in South Africa; graphite deposits are significant in Madagascar and Mozambique; large lithium deposits are in Zimbabwe; other important countries are Zambia for copper; Namibia for uranium; Guinea and Ghana for bauxite. For the past 20 years, China has relied heavily on goods from Africa. Beijing's commercial and geostrategic interest in African minerals has been rekindled by the recent acceleration of the global energy transition and China's strategic dominance of critical mineral processing. Chinese control over extraction processes (estimated at approximately 7% in 2018) is being increased with the aim of securing direct access to resources (Castillo Purdy, 2022).

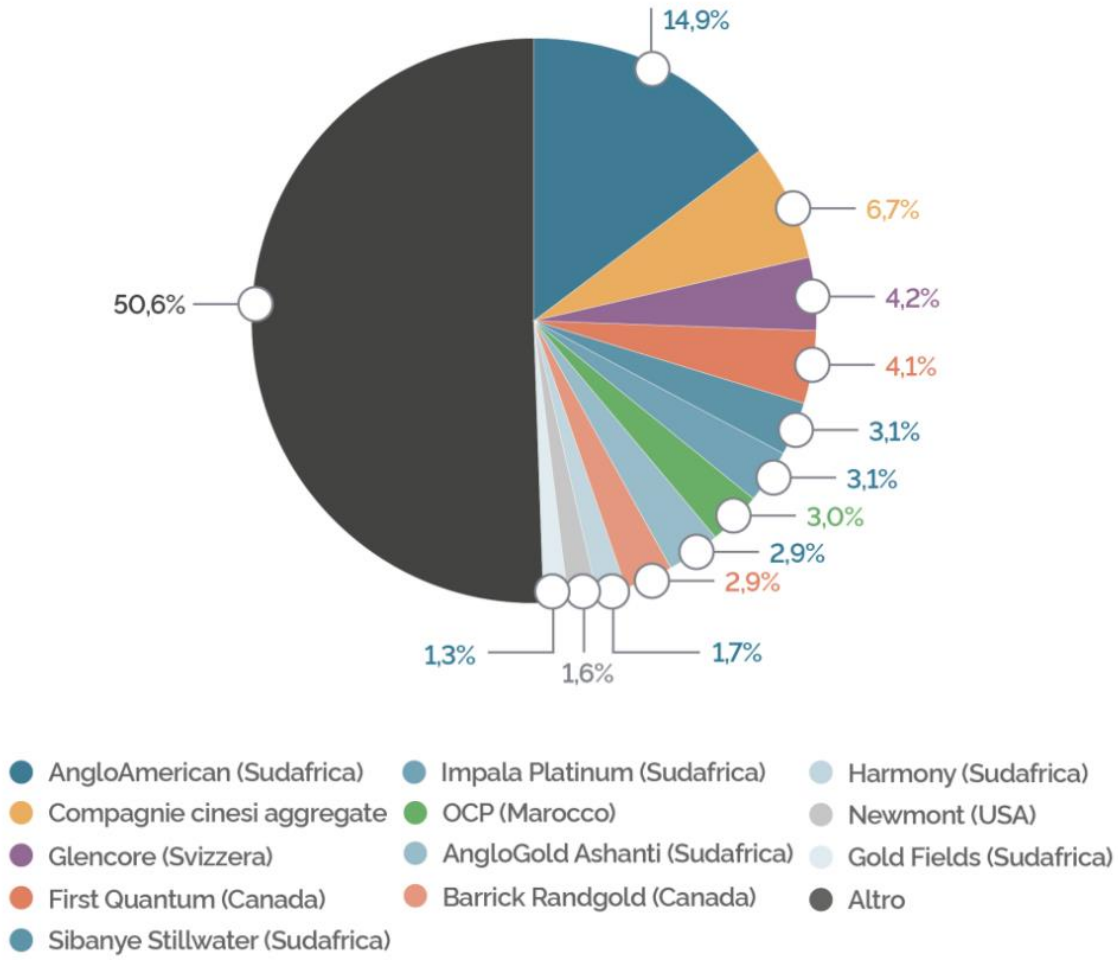

Figure 42. Market share of the whole mineral production in Africa (Source: IEA 2023).

Due to its prospective development, Africa presents itself as a particularly promising market for China in the context of the energy transition. Africa now has the largest percentage of its population without access to electricity, but over the next 30 years, the continent's energy needs will rise due to both population growth and urbanization. For Beijing, expanding its worldwide leadership in renewable energy would entail bringing green technology to a market of at least one billion prospective customers. Additionally, this would improve ties between China and Africa (IEA, 2022).

3.5 THE DRAWBACKS OF CHINESE INVESTMENTS: THE DEBT, THE MILITARY PRESENCE, THE EXPORT OF CHINESE LABOR

As some may have already imagined, the solid system built by China in Africa is not a non-refundable one. To compensate for the loans and investments made in the continent, from which many nations and citizens have took advantage (some more, some less) China has founded a solid system based on 3 main points: the debt, the military presence and the export of Chinese labor.

3.5.1 THE DEBT

As already stated several times in this study, China has made huge investments and given great loans to many African countries, who one day will have to pay them back together with interests. Chinese policy in Africa is sometimes referred to many US commentors as a "debt trap," a purposeful plan to lend unmanageable amounts of money to African nations, pull them into China's sphere of influence, and impose unreasonable responsibilities on them. Every nation has a different scenario. It is true that certain African countries have taken out large loans from China and are deeply in debt, which has been made worse by the invasion of Ukraine, the COVID-19 pandemic, and excessive interest rates; but, this cannot be the only reason for these problems. However, several nations have worked with China to establish reasonable and controllable debt agreements (Vines, Wallace, 2023).

One of the main initiatives which led China to invest in Africa was the Belt and Road Initiative (BRI). The BRI, which seeks to establish a new geopolitical order from which the US is ostensibly excluded, has provided Africa with substantial financial support. Since its inception in 2013, the Belt and Road Initiative (BRI) has been a crucial instrument of Chinese diplomacy, despite harsh criticism from the US. Furthermore, the BRI has always been recipient-driven, with nations choosing the projects or what will be developed within their borders, defying the claim that China is debt-trapping. Beijing has occasionally been forced to change course and implement new policies because these issues stemming from local governance challenges, which may have negative effects on the economy, the environment, and politics, are reflected in this project, which will undoubtedly benefit local governments and benefit China. Chinese loans have filled a finance gap that Western governments have

not been ready to deal with, giving African countries the money they need to develop infrastructure and promote economic growth, mostly through trade. Africa's inadequate infrastructure has mostly benefited from Chinese loans, which have been used for 30% of the renovation of antiquated transportation infrastructure and 40% of power generation and transmission (Chen, 2018). The World Bank and the International Monetary Fund (IMF) have been crucial in provide the required direction for prudent borrowing.

The accusation of a "debt trap" stems not only from China's massive loan portfolio but also from the project's advantageous terms, which include long payback durations and cheap interest rates (Vinicius de Freitas, 2023). However, these loans could occasionally stop being profitable. The ports of Mombasa and Djibouti are two prime examples. The Exim Bank of China was offered the port of Mombasa as collateral in the event that the $3.2 million debt was not paid back. China invested $15 billion to establish the port in Djibouti and currently owns 82% of the country's foreign debt; if the debt is not repaid, China may be granted control of the port. Other examples of debts that will be very difficult to repay in the future are represented by Angola, Egypt, Kenya and Zambia.

After its 30-year civil war ended in 2002, **Angola** got substantial Chinese investment, which totaled to $18 billion in debt in 2022. Angola resorted to China for assistance after the conflict destroyed the nation's infrastructure and claimed the lives of over 500,000 people. However, Western nations were engaged in the "War on Terror" in Afghanistan and Iraq. In exchange for oil, China promised to invest in infrastructure, which led to a boom in Chinese investment. Both positive and negative effects resulted from Chinese investment: while Chinese knowledge was able to build new urban complexes, stadiums, and hospitals, it was unable to provide a competent labor force for Africa, with the majority of jobs going to Chinese laborers. Furthermore, the quality of infrastructure varied widely due to corruption at a local and provincial level (Vines, Butler, Jie, 2022).

Egypt's debt to China is not significant, however, it is worth noting that it was the first Arab and African nation to establish direct diplomatic ties with the PRC in 1956. During the Suez Crisis, China showed solidarity by providing a grant of $4.5 million to Egypt. The relationship between the two countries has strengthened under the leadership of Egyptian President Al-Sisi. In 2014, Sisi visited China to sign the Comprehensive Strategic Partnership (CSP), and since then, they have signed at least 25 bilateral agreements. China is also Egypt's top import partner, and Egyptian exports to China have more than doubled between 2010

and 2018. It is estimated that Egypt has received loans totaling $3.4 billion from China between 2000 and 2017. (El Dahshan,2022).

The debt of **Kenya**, estimated at $6.83 billion by 2022, largely stems from the $5.3 billion Standard Gauge Railway project that connects Nairobi to Mombasa. Concerns have been raised about Kenya's ability to repay its debt to China, leading to speculation about the fate of the Mombasa Port. It is important to note that Chinese loans are only one factor in the country's significant increase in public borrowing, resulting in a debt-to-GDP ratio of 69% in 2020. In order to foster a more mutually beneficial relationship, recent agreements between Kenya and China should prioritize cooperation rather than exploitation. A notable example is the construction of a new expressway in Nairobi by a Chinese company, with ownership eventually reverting back to Kenya after 30 years.

The relationship between **Zambia** and China dates back to 1964 when China supported Zambia's independence from Britain. In the following years, China assisted in the construction of the TAZARA railway line between Dar es Salaam in Tanzania and Kapiri Mposhi in Zambia. However, Chinese involvement in Zambia decreased significantly until the late 1990s and 2000s when the Going Out strategy and Belt and Road Initiative were introduced. This led to Chinese projects in Zambia, including the building of a dam, railway, airports, and hospitals. These initiatives were part of the BRI's global infrastructure development plan. Despite these investments, Zambia's debt has become unmanageable, reaching nearly $34 billion by the end of 2021, with approximately one-third of this debt owed to China. In 2018, the Zambian opposition recognized Taiwan, leading to accusations from the Chinese Communist Party of interference in Zambian affairs and a threat from the Chinese ambassador to withdraw investment.

The Chinese loans given to African nations have been subject to criticism due to their lack of transparency, limited accountability, and public scrutiny. According to researcher Helmut Asche, approximately half of the debt contracted by African countries from China is "hidden debt," lacking clear terms of repayment and repayment status. For instance, a recent study by the Johns Hopkins University's China Africa Research Initiative (CARI) revealed that the reported amount of Zambia's debt to Chinese public and private lenders was significantly lower than the actual amount of $6.6 billion. This lack of transparency has led to scrutiny and suspicion towards China (Vines and Wallace, 2023).

However, it cannot be ignored that China may use these loans strategically to expand its influence in Africa and secure access to vital resources. As an emerging superpower and competitor to the US, establishing stronger economic ties in Africa would align with China's global aspirations.

3.5.2 THE MILITARY PRESENCE

Since 2001, China's involvement in peacekeeping missions has significantly increased. As a permanent member of the UN Security Council, China currently has the largest number of troops deployed, largely concentrated in countries that are major suppliers of raw materials (Bommino, 2022). When it comes to military bases, China places a strategic focus on countries surrounding the Horn of Africa and the Gulf of Aden, with its main base located in **Djibouti**, a crucial location for maritime traffic to and from the Suez passage. This decision has been met with criticism, as the Chinese base is only 6 miles away from a US military base in the same country (Vines and Wallace, 2023). While there have been rumors of China seeking berthing rights in other countries, there is little evidence of plans for a fully established base at this time. However, some speculate that China is expanding its military presence in Africa to further its geostrategic interests and may have intentions to establish its first permanent military presence on the Atlantic Ocean, potentially in the city of **Bata** in Guinea (Bommino, 2022). Nevertheless, these speculations remain unconfirmed.

China has made significant strides in the defense industry, generating substantial profits from the sale of armaments. One of its largest customers is Africa. Data from the Stockholm International Peace Research Institute (SIPRI) shows that between 2017 and 2020, China exported almost three times more arms to Africa than the United States. From 2010 to 2021, the total value of arms exports to Africa reached $9.32 billion, with China accounting for 22% of this, second only to Russia. Sixty percent of Chinese arms exports were directed to Tanzania, Nigeria, Sudan, Cameroon, and Zambia, where China has made substantial investments (Cheraghlou and Aladekob, 2023).

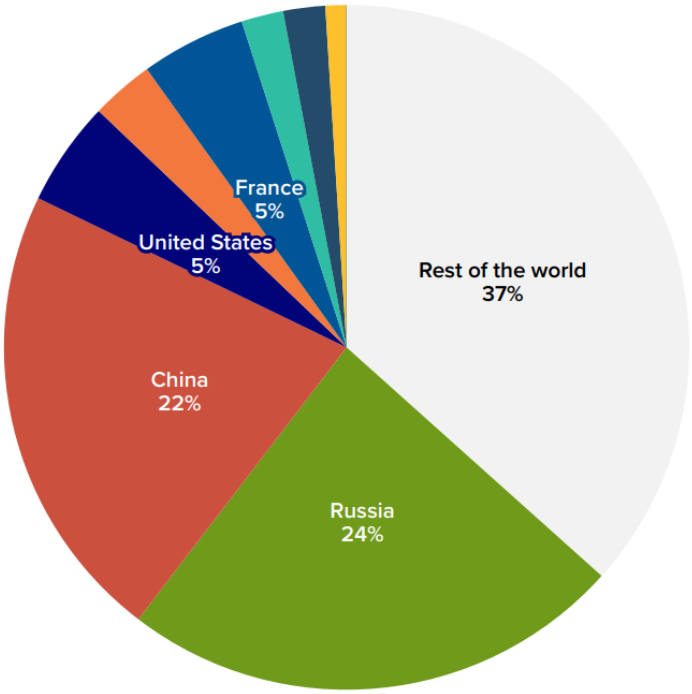

Figure 43. Share of Top 10 in Total Arms Exports to Sub-Saharan Africa 2010-2021 (%) (Source: SIPRI Importer/Exporter TIV Tables).

The 2022 invasion of Ukraine by Russia presents an opportunity for China to expand its influence. Many African countries, including Nigeria, had signed import agreements for arms supply with Russia, which may now struggle to honor these contracts due to the ongoing conflict. In addition, international sanctions following the invasion may limit Russian activities in Africa. In light of these developments, African countries like Nigeria are looking for alternatives to Russian arms, making China the obvious choice. China has become the top arms exporter to Nigeria, surpassing Russia for two consecutive years. Furthermore, China has also invested in training military personnel from various African countries (Panel III, 2020).

3.5.3 THE EXPORT OF CHINESE LABOR

As a result of its investments in Africa, there has been a significant influx of Chinese migrants to the continent. These migrants have various roles, including civil servants, temporary laborers working on government-funded projects, entrepreneurs, and transit workers. The main destinations for Chinese migrants include Ghana, South Africa,

Madagascar, Zambia, and the Democratic Republic of Congo (Cheraghlou and Aladekob, 2023). Chinese migrants have played a crucial role in establishing small local workshops, retail shops, and other service providers. They also create linkages to their home country, facilitating the flow of goods, products, and capital, primarily through informal channels.

Although there has been a considerable influx of Chinese laborers to Africa, a 2019 report by scholars from SOAS University of London and the London School of Economics and Politics found that, contrary to media perception, local workers accounted for 90% of employees in Ethiopia and 74% in Angola (Oya and Schaefer, 2019). In Angola, over the past decade, there has been a significant increase in the localization of the workforce as more Chinese companies have entered the country. The main factors driving this shift from Chinese to local manpower are the host country's labor laws and the type of labor needed (skilled versus unskilled). In the early stages of BRI projects, many firms preferred to use Chinese workers for skilled positions as they were already familiar with the operations and technology of these companies. However, since 2015, the number of Chinese workers has decreased by 30.7%, potentially due to the increasing cost of Chinese labor.

To further its economic and investment objectives in Africa, China has also made significant investments in the human capital of the continent, providing scholarships and training programs for African professionals. Currently, there are 61 Confucius Institutes operating within 46 African countries. Since 2004, over five thousand teachers have been sent to support these efforts.

3.6 AFRICANS REACTION TO CHINESE PRESENCE

African governments often turn to China for political recognition and legitimacy, as well as aid, investment, infrastructure development, and trade to support their economic development. They hope that their interactions with China will differ from their experiences with Western countries, through engaging economically or investing in high-risk projects or remote regions. Some aspire to emulate China's rapid economic growth and believe that their own countries can benefit from China's recent success in alleviating poverty. Local officials view China's role in Africa positively, often perceiving China as having more altruistic motives compared to Western governments and corporations. African leaders applaud China's contributions to their nations' infrastructure, pointing out tangible improvements

such as expanded economic activity, job creation for local workers, and visible advancements in roads, railways, bridges, and other transportation networks (Hanauer Morris, 2014).

Despite the widespread praise for China's initiatives in Africa, there are some who express discontent with Chinese involvement. Various groups such as labor unions and civil society organizations have voiced concerns about poor working conditions, disregard for the environment, and the displacement of jobs by Chinese companies. These critics argue that China takes advantage of African governments' vulnerabilities to negotiate unfair deals, resulting in a neo-colonial dynamic where Africa provides raw materials while China benefits from manufacturing goods. In response to these criticisms, Beijing has made efforts to address African concerns and create a more equitable relationship between China and Africa. This includes promoting sustainable economic and trade practices, fostering cultural exchanges, and supporting stability in conflict-prone areas of Africa. China recognizes the potential benefits for both parties in these adjustments and aims to continue securing natural resources and generating profits while also supporting job creation and economic development in Africa (Hanauer & Morris, 2014).

3.7 THE UNITED STATES IN AFRICA

When talking about Western countries we refer to the United States and the European union. Let’s analyze how the activities of these two economic powers in Africa deal with those of China.

The involvement of China in Africa primarily centers around the extraction of natural resources, development of infrastructure, and manufacturing. In comparison, US involvement focuses on high-tech trade and services, along with aid strategies that aim to promote democracy, good governance, and human development. While China's approach of not attaching conditions to their investments may lead to inefficient decision-making and corruption, it does not undermine the economic and political goals of the US in the region. In fact, the infrastructure built by China helps to reduce operating costs for businesses and increases the size of regional markets, thereby creating more opportunities for both indigenous and US investors. The interests and approaches of the US and China are not inherently conflicting, and US officials, such as Presidents George W. Bush and Barack

Obama, have denied any notion of a "zero sum" competition between the two countries for influence and access in Africa. Ultimately, China does not pose a strategic threat to US interests in Africa.

Although the US and China may not be seen as competitors in Africa, there is a possibility for commercial competition to arise if American businesses become more involved in African markets, as previously proposed by President Barack Obama. However, this competition could actually benefit African nations. It could result in more favorable commercial terms negotiated by African governments and improved conditions for local communities. It is also worth noting that American companies are more likely to hire local workers, transfer technological knowledge to local partners, adhere to labor standards, and contribute to initiatives that promote the well-being of their employees, in comparison to Chinese companies. These practices may encourage Chinese companies to follow suit in order to secure deals, remain competitive in the local labor and consumer markets, and improve China's reputation in Africa (Hanauer Morris, 2014).

There have been instances where it appears that the US is lagging behind China. While China held its initial Africa summit in 2000, the US did not hold one until 2014 and has only hosted two since. The first summit received some criticism for its lack of tangible outcomes. This summit serves as a crucial symbol of the US's commitment to its relationships with African nations, and it has been well-received by African leaders, with the majority of invited leaders expected to attend. It is worth noting that China and Africa share a common history of not being colonizers, and China's assistance in aiding some African regions to gain independence has strengthened their bond and bolstered China's influence in the region, while the US's influence has remained stagnant. China's economic dominance in Africa has far surpassed that of the US. With China providing the largest influx of foreign direct investment and supporting the livelihoods of hundreds of thousands of Africans, it surpasses the US by two-fold in terms of foreign direct investment. China's booming economy, now the second largest in the world, naturally drives its interest in Africa's raw materials to sustain its immense manufacturing industry. In contrast, the US has had to compete with China for support from African leaders, forcing them to make a choice. This dilemma is reminiscent of the Cold War and has led many African leaders to view China as a more favorable development model. It would be more effective for US diplomacy to avoid framing relationships with African nations as an "us-versus-them" scenario, particularly in

relation to China. This approach may face significant challenges if tensions between the two major powers continue to escalate.

Although China's presence in Africa continues to grow, some African countries may seek increased cooperation with the US. Both government and business leaders in Africa recognize the significance of the US market, the strong leadership of various American companies, and the high standards they uphold, particularly when compared to the questionable transparency and environmental records of many Chinese companies. However, there are several factors that have hindered American businesses from fully engaging with Africa, such as perceived high risk, inadequate infrastructure, and a lack of government support. Nevertheless, with the US now equipped with a range of government tools, they are poised to expand their involvement in Africa. In certain sectors, such as healthcare, financial technology, and renewable energy, American companies may hold a competitive edge over their Chinese counterparts. For many Africans, the United States remains a symbol of democratic governance and serves as a source of inspiration. It is crucial for Washington to continue supporting African democrats, civil society, and media organizations that advocate for open and inclusive governance, even in challenging circumstances. One advantage the US holds is its commitment to contract transparency. Both Americans and Africans have a shared interest in promoting greater transparency in business practices across Africa. This is particularly evident in cases such as Kenya's $5 billion loan agreement with China's Export-Import Bank to fund the construction of the Mombasa-Nairobi railway. Without a clear understanding of loan terms, it is difficult for Africans to determine whether or not infrastructure projects are truly beneficial to their development. The US can take advantage of China's lack of transparency by offering more transparent and mutually beneficial agreements.

CHAPTER 4

IMPACT ON THE WORLD ECONOMY

4.1 FORECAST ON COMMODITIES FUTURE AVAILABILITY

Let's go back to the protagonists of this study, critical raw materials. Along this thesis, we have focused our attention on how the high presence of natural resources in Africa (most of which are included in the CRMs list) have drawn the attention of the world's largest economies, who now are striving to establish good relationships with Africa so as to guarantee their access to its commodities. The attention that the USA, Europe and China are placing on the African continent and the agreements they are signing, will change the world economic and geopolitical asset completely.

As previously mentioned, the shift towards renewable energy has been a driving force in establishing closer ties with Africa. The global population's increasing energy demands have also played a significant role in this decision. While a high population growth rate does not necessarily equate to a future shortage in raw materials, it ultimately depends on the overall supply and demand balance. The supply side of this balance is influenced by a combination of raw material prices, mining investments, and the technical potential for increasing extraction and refining capacities, which will determine the flexibility of the future supply.

The main concerns about the ultimate future supply capacities for selected material are the following:

- In the foreseeable future, end-users outside of China will continue to face the risk of Chinese dominance in the global rare earth value chain, particularly for **Rare Earth Elements** (REEs) such as dysprosium, neodymium, and praseodymium. By 2030, the growing annual demand for these resources is expected to far surpass global production levels. Unless additional sources of supply are developed, there will likely be a shortage of these materials after historically accumulated reserves are depleted (Adamas Intelligence, 2019).
- At present, the **lithium** market is experiencing a surplus due to recent increases in mining and refining capacity. In the short term, ongoing projects can help maintain market balance. However, in order to meet the rapidly growing demand in the

medium term, significant investments are required on a global scale. By 2024-2025, the market is expected to enter a severe volume deficit. Although demand for lithium is increasing exponentially, it is not anticipated that there will be significant physical shortages in the future due to the abundance of global resources (Infinity Lithium, 2019).

- In regard to **cobalt**, the main concern for future supply security is the high level of supply concentration. Currently, the Democratic Republic of the Congo accounts for approximately 60% of global cobalt mine output, while China controls over 60% of the refined output. Although the Democratic Republic of the Congo holds significant reserves and will play a crucial role in future mine supply, there are concerns regarding low governance, high instability, and the reliance on artisanal and small-scale mining, which makes up 10-20% of the country's output. Depending on the battery technology used and despite ongoing efforts to find substitutes, additional mining projects may need to be developed to prevent a market deficit from occurring after 2025 (Bobba Carrara Huisman Mathieux Pavel, 2020).

4.2 IMPACT ON COMPANIES AND LOGISTICS

The COVID-19 outbreak caused a surge in prices and disrupted the trend of globalization, where nations relied on importing resources from other countries in times of crisis. Due to the pandemic, supply shortages occurred, and China scaled back production of certain metals, such as aluminum and steel. Additionally, the move towards renewable energy sources has led to a global increase in demand for critical raw materials (CRMs).

The prices of raw materials have been volatile since the onset of the pandemic. Over the course of three years, the cost of these materials has noticeably increased, partially due to the repercussions of the pandemic and the unrest in Ukraine. This steep incline in prices can be attributed to a behavioral response - when the cost of raw materials is high, there is a stronger incentive to invest in mining and exploration, but when prices drop, the potential profitability of these ventures decreases, resulting in reduced production and subsequent price hikes in the following years. This trend has also been observed in Europe in recent years (IESSOLER, 2023).

The rise in prices for CRMs has had a significant impact on companies worldwide. While companies with longer supply chains have been able to offset the increases, those with shorter supply chains have had to rely on existing stock to resist the price hike. It is evident that all companies, including SMEs, have had to adjust their prices to align with the market trend. According to a study by McKinsey, economies facing the challenges of climate change, the pandemic, and potential supply and production disruptions are at risk of losing 40% of their total profits (COSMAN, 2022). Projections indicate that prices will continue to rise in 2024, but the situation in China will remain a crucial factor in determining demand and prices (IESSOLER, 2023).

The transportation industry has experienced significant transformations as a result of the pandemic. Prior to COVID-19, the Far East served as the primary source of raw materials for Western nations. However, as demand for these materials skyrocketed in the summer of 2020, the logistics market was not equipped to handle such high volumes. Additionally, increased naval and port tariffs have further hindered maritime transport. These factors have led to a noticeable increase in the cost of naval freight since May 2020.

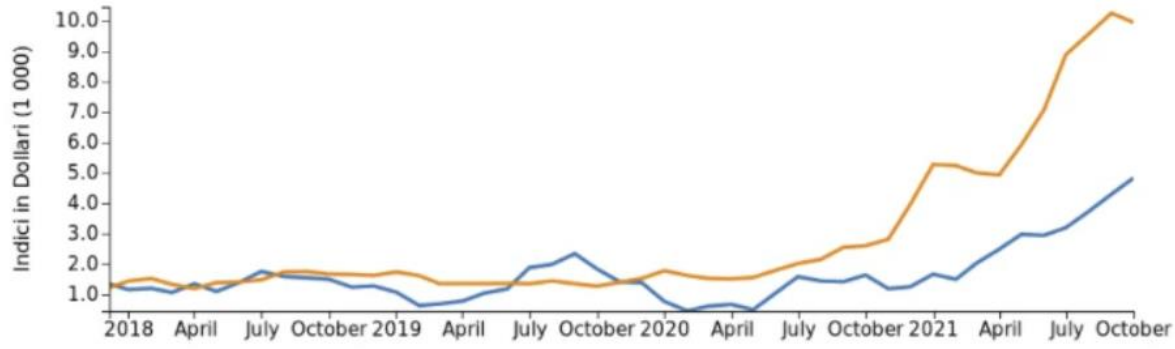

Figure 44. Increase of the naval freight costs after May 2020 (Source: Pricepedia).

At present, there are indications that the steep increase in maritime freight costs, ongoing for nearly a year and a half, may finally be showing signs of stabilizing. It is anticipated that the introduction of larger and more environmentally friendly container ships, which has spurred the production of new containers, will help in this regard. However, it is unlikely that freight prices will revert to pre-pandemic levels (COSMAN, 2022).

4.2.1 CRMs' HIGH PRICES IMPACT ON EUROPEAN FIRMS

The demand for critical raw materials and other economically significant resources is projected to surge in the near future. In anticipation of this, the European Council and Parliament reached a tentative agreement on the Critical Raw Materials Act (CRMA) in November 2023. As mentioned in chapter 1.6, the European CRMA is primarily aimed at enhancing and diversifying the EU's supply of critical raw materials. The regulations introduced in November 2023 also strive to reinforce Europe's strategic autonomy.

Rare earths are essential components in today's society. As the EU moves away from fossil fuels, the demand for base metals, battery materials, and rare earths is set to grow exponentially. The transition towards green energy systems will necessitate the development of local production for batteries, solar panels, permanent magnets, and other clean technologies. To meet this increasing demand, access to a wide range of critical raw materials (CRMs) will be crucial.

In addition, CRMs are important to the EU for:

- Industrial value chains (non-energy raw materials are linked to all industries across all stages of the supply chain);
- Strategic technologies, such as space and defense;
- Climate, energy, and environment;

Localized production is a vital element in the overhaul of the EU's energy and transportation systems, driven by initiatives such as the REPowerEU plan and the proposed ban on internal combustion engines by 2035. As a result, the CRMA serves as a critical component in this wide-reaching societal transformation.

The EU's reliance on other countries for CRMs is a significant concern. While the EU cannot achieve complete self-sufficiency, it strives to diversify its sources. Presently, the EU is solely dependent on one country for certain critical raw materials; for instance, all heavy rare earth elements are sourced from China, 98% of boron comes from Turkey, and 71% of platinum from South Africa. Having multiple suppliers for a particular material can help avoid potential supply disruptions (Rutkowska-Subocz, 2023).

Implementation of the CRMA would undoubtedly have a significant impact on stakeholders in Europe. One crucial aspect of this regulation is the establishment of new standards for domestic extraction, processing, and recycling of CRMs. The CRMA sets minimum benchmarks for the percentage of EU demand that must be met by domestically

sourced, processed, and recycled raw materials. This added pressure on the mining and processing industry to boost their production capabilities within the EU. While this presents opportunities for job creation and economic growth, it also brings challenges such as meeting the benchmarks, securing investments, finding a skilled workforce, and ensuring compliance with the new regulations. Stakeholders must also have a clear understanding of how these benchmarks are determined. In addition to emphasizing the importance of circularity, the CRMA also establishes targets for domestic recycling of CRMs. This highlights the need for increased investments in recycling facilities and technologies and offers incentives for developing more efficient and effective recycling processes. However, the industry may face obstacles in meeting these targets, particularly for materials with complex recycling requirements. Additionally, resistance to building new recycling facilities and potential conflicts over waste management may arise in local communities. The CRMA does not specify if recycled raw materials must come from end-of-life products or if they can also be sourced from manufacturing waste, nor does it indicate if they must originate from within the EU. The increasing demand for domestically sourced and recycled raw materials will have an impact on the manufacturing industry and final producers. Manufacturers will have to adapt their supply chains and procurement strategies to adhere to the CRMA's regulations, which could result in higher costs and potential disruptions in the supply chain. The Act is also expected to bring changes in the availability and pricing of products. The push for increased recycling of raw materials may force manufacturers to raise prices for particular products due to the high costs involved in the recycling process. Moreover, the CRMA will have an impact on both EU and non-EU investors. On one hand, there may be increased investment opportunities in projects related to raw material extraction, processing, and recycling; on the other hand, investors will need to navigate potential market volatility and mitigate risks associated with regulatory compliance and sustainability concerns.

The CRMA marks a significant economic and industrial transformation for the EU Single Market. As a result, partnerships between investors, companies, governments, and local authorities will play a crucial role in promoting responsible investment practices and creating a robust raw materials supply chain. The implementation of the CRMA would also have implications for non-EU countries that previously supplied commodities to the European Union. The ripple effects of the CRMA would extend beyond the borders of the EU (Rutkowska-Subocz, 2023).

According to recent data, there has been a significant increase in the cost of imported raw materials (such as food, agro-industrial products, and minerals) in Europe, with an average rise of 25.2%. In certain cases, such as ferrous metals, the increase has been exceptionally high, reaching 91.3%. This drastic hike in prices has also affected other essential commodities, such as natural rubber, which has seen a 35.4% increase, and meat, which has risen by 50%. As a result, various industries have been impacted, including construction, cardboard, pulp and paperboard, plastics, transportation, sports equipment, furniture, housing, and agri-food production. Unfortunately, this surge in prices has disproportionately affected small and medium-sized enterprises (SMEs), who often lack the bargaining power to pass on these costs to their customers. As a consequence, many SMEs have experienced a decline in their profit margins (Hendrickx, 2021). The rising costs of raw materials have led many companies in Europe to consider increasing prices for their final products. However, there have been some recent developments that may provide relief for consumers. Some companies have stated their intention to roll back price increases that were implemented due to the high costs of energy and other raw materials. This may be a sign that inflation in the euro zone has reached its peak, bringing hope for a soft landing for the region's economy. However, these cuts are not yet widespread and companies still face challenges such as higher labor and borrowing costs. It may also take some time for these changes to be reflected in retail prices as consumer goods, food producers, and retailers pass on their increased expenses. Some companies, like packaging giant Smurfit Kappa, have been able to keep prices stable by negotiating agreements with their suppliers and increasing purchasing volumes. Ultimately, producers and vendors are hoping for a decrease in energy prices and a slowdown in inflation.

However, there are still factors that may keep commodity prices high, such as the reopening of China and signs of a global economic upturn. During the height of the pandemic, many companies were forced to cut costs in order to deal with the high prices of raw materials. Now that these prices seem to be decreasing, some companies are choosing not to make cuts even though they are still facing higher labor and borrowing costs. Companies in more commoditized industries, like packaging, may face pressure to reduce prices in order to maintain their market share (Alves Halpin, 2023).

4.2.2 CRMs' HIGH PRICES IMPACT ON AMERICAN FIRMS

Despite a decrease in prices of oil, transportation, and other raw materials in recent months, many large businesses in the US have continued to raise their prices at a rapid rate, with no intention of changing course. This strategy has benefited corporate profits but may also contribute to robust inflation in the long term. As a result, policymakers at the Federal Reserve may feel pressured to continue raising interest rates, potentially increasing the likelihood and impact of an economic downturn. This approach of maintaining high profit margins by passing on cost increases has been used by many companies, including PepsiCo, whose CFO stated in February that they had raised prices enough to offset future cost pressures. The company reported a 16% increase in the average price of snacks and beverages in the first three months of the year. This is the same strategy and increase that was implemented the year before. While customers may have expressed dissatisfaction, they have largely continued to purchase these products, leading to shareholder approval and no comment from PepsiCo (Talmon Rennison, 2023).

Similarly, other consumer goods companies have also seen success while continuously raising prices. According to FactSet, the average company in the S&P 500 stock index saw an increase in net profit margin at the end of last year, contrary to the expectations of Wall Street analysts who predicted a slight decline. While margins are not currently at their peak in 2021, analysts predict that they will continue to expand in the latter half of 2023. In recent years, many companies have had a legitimate reason to increase prices, such as the impact of Covid-19 and the war in Ukraine. However, as the pandemic subsided and a truce was reached in the war, this reasoning lost its validity. Though there are still challenges in terms of inventory, production, and air freight, delays caused by weather and flooding have subsided and orders have begun arriving, leading to increased prices for products.

However, the justifications for these price increases are starting to diminish. The Producer Price Index, which measures the costs that businesses face for goods and services before they are sold to consumers, has decreased from 11.7% to 2.3%. While the Consumer Price Index, which tracks the prices of household expenses, has also seen a decline, it is at a much slower rate. For example, the price of carbonated drinks increased by nearly 12% in one year. In comparison to Europe, where companies may be struggling with increased costs,

American companies are facing criticism for being excessively profit-driven (Talmon Rennison, 2023).

Some analysts argue that there are other factors contributing to the sustained high consumer prices. When people began to emerge from the pandemic, the demand for goods and services was higher than what suppliers were able to provide due to lockdowns and supply chain constraints. Economists, such as Mr. Beckworth from the Treasury Department, suggest that these high prices would not have been possible if consumers were not willing or able to spend more. In this analysis, factors such as government stimulus payments, investment gains, pay raises, and low interest rates for mortgage refinancing play a larger role in driving up prices than corporate profit seeking. While overall spending on recreational experiences and luxuries may have peaked, credit card data from larger banks still shows robust spending, allowing companies to continue to raise prices. For example, major cruise lines like Royal Caribbean have increased their prices as demand for cruises increases heading into the summer. It is clear that price increases have not stopped consumers, but have instead disproportionately affected those who were already struggling before.

This price increase has forced many people, especially those in lower income households, to switch to more affordable products. For example, McDonald's reported a sales increase of 12.6% per store in the three months leading up to March, compared to the same period the previous year. 4.2% of this growth is attributed to increased traffic, while 8.4% is the result of higher menu prices. The company explains that these recent menu price increases were necessary due to higher costs for labor, transportation, and meat. Even though transportation costs have eased, the prices have remained the same. However, the costs of meat and twenty-nine other commodities have seen a decrease in their price hikes.

Many other companies have experienced an increase in profits, despite seeing a decrease in sales due to higher prices. This phenomenon, known as "price over volume," was seen in Colgate-Palmolive, where operating profits increased by 6% in one year. This was the result of a 12% increase in prices, even though sales volume decreased by 2% (Talmon Rennison, 2023).

If these inflation pressures materialize, and there are signs that we are beginning to see inflationary pressures build-up, then consumers will be under considerable strain early

next year or by the middle of the year. According to research from Glenmede Investment Management, it is likely that the current high profits seen by corporations will not continue for much longer. Evidence suggests that more consumers are starting to reduce their spending on more expensive products, in response to price increases. This may become an obstacle for companies that rely on price-conscious customers. For example, Dollar Tree saw an increase in sales but a decrease in margins, while companies like PepsiCo and McDonald's have seen drops in their stock prices as investors worry about their ability to maintain high profits. Despite consumer dissatisfaction, investors are relieved that companies have performed well in the first quarter, which has prevented a widespread drop in stock prices. However, if inflationary pressures continue to increase, as is currently the case, it is possible that consumers will face significant strain in the near future.

4.2.3 CRMs' HIGH PRICES IMPACT ON CHINESE FIRMS

The impact that raw materials high prices had on the Chinese economy is different according to the sector.

Despite the recent surge in prices for new-energy vehicles (NEVs), the market in China, which is the largest market for NEVs globally, is expected to continue its strong performance. This can be attributed to the strong domestic demand and steady economic growth. The increasing costs of raw materials, particularly the key components used in automotive batteries, have prompted many NEV manufacturers, including industry leader Tesla and its Chinese counterparts, to raise prices. As of March 2022, approximately 40 models have seen price increases, with Chinese NEV producer Xpeng announcing a price hike of 10,100 yuan ($1,587) to 20,000 yuan for their vehicles. However, the company plans to maintain moderate prices during the slower sales period of the Spring Festival in February. In response to various factors such as the continuous increase in raw material prices and limited capacity among suppliers, Chinese electric vehicle start-up WM Motor has announced that it will adjust the prices of its models currently on sale. The price increases will range from 7,000 to 26,000 yuan. Similarly, BYD has also raised its prices by 3,000 to 6,000 yuan. However, the main contributor to these price hikes is Tesla. Among all the automakers that are hiking prices, Tesla has made the most frequent adjustments, doing so

three times within a seven-day period. According to Elon Musk, CEO of Tesla, the company is facing significant inflationary pressures in terms of raw materials and logistics (Zhang, 2022).

In China, there are two primary factors driving the recent price increases: raw material supply and cost. The cost of key components used in the production of automotive batteries, such as nickel and lithium, has significantly risen, with the price of lithium increasing from 50,000 yuan per ton in early 2021 to 500,000 yuan per ton in 2022, representing a year-on-year increase of 479.3%. As a result, NEV manufacturers have had to raise prices in order to maintain their profits. " According to Cui Dongshu, secretary general of the China Passenger Car Association, the recent price hikes in raw materials for NEVs are a cyclical occurrence, and automakers are responding by raising their prices, driven by market forces. The significant rise in supply chain costs has even led some car manufacturers to suspend production and sales of their top-selling models, as the surging raw material costs would result in losses of over 10,000 yuan for each vehicle (Zhang, 2022).

The Chinese government has taken notice of the fluctuations in the NEV market and the Ministry of Industry and Information Technology (MIIT) has urged companies to improve communication and collaboration to ensure a long-term and stable strategic partnership. The goal is to guide lithium prices towards sustainable levels.

Looking at the perspective of consumers, several NEV manufacturers have shifted some of the rising raw material costs onto buyers, particularly domestic customers, by raising retail prices in response to the recent increase in prices for petrol and diesel. However, research by Sinolink Securities has shown that despite the high prices of both lithium and oil, the appeal of electric vehicles to consumers remains strong. In contrast, profit growth for other Chinese industrial companies has slowed significantly, particularly in 2021, due to the the negative impact of high raw material prices on factory margins (Qiu Woo, 2021). After the pandemic, these companies faced new challenges such as higher raw material costs and global supply chain disruptions, which also affected the NEV market, causing a decrease in demand. Additionally, China's factory activity slowed in June 2021 due to the resurgence of COVID-19 cases in the export province of Guangdong, which led to limitations on port processing capacity due to epidemic prevention and control measures.

In response to the high raw material prices that have squeezed manufacturers' profits, Chinese policymakers have taken measures to prevent price increases from being passed on to consumers. However, despite government efforts to curb runaway commodity

prices, China's producer price inflation remains at a high level. This situation has raised concerns among Chinese leaders, especially regarding the impact on small firms that are unable to pass on the higher costs to consumers. To support businesses in dealing with rising commodity prices, the Chinese government has proposed reducing the amount of cash reserves that banks are required to hold. According to data from the National Bureau of Statistics (NBS), China's consumer price index (CPI) only saw a modest increase of 1.1% in June compared to the same period last year, lower than the expected 1.3% rise predicted by a Reuters poll. This suggests that there is limited pass-through from the high industrial prices to consumer prices. Dong Lijuan, a senior statistician at the NBS, stated in a data release that the domestic policy of ensuring adequate supply and stabilizing commodity prices is starting to take effect, leading to a slowdown in price increases for industrial products due to improvements in market supply and demand. Pork, a key component of China's CPI, has seen decreasing prices in recent months, resulting in a 1.7% drop in food prices. To address the issue of declining pork prices, the Chinese government announced plans to purchase pork reserves at the end of last month. According to Yi Gang, the governor of China's central bank, the country's annual average consumer inflation for the year is expected to remain below 2%, which is well below the government's target of around 3% (Qiu Woo, 2021).

4.3 WHO GAINED?

While many businesses have been negatively impacted by the rising prices of raw materials, companies involved in the extraction and supply of natural resources have seen a significant increase in profits. In addition, enterprises engaged in research and innovation initiatives have also experienced significant growth. The European Union has allocated €667 million to support 1,043 organizations participating in the Horizon Europe program, the EU's main funding program for research and innovation with a budget of €95.5 billion. This program helps tackle climate change, supports the achievement of the United Nations' Sustainable Development Goals, and boosts the EU's competitiveness and growth. It also facilitates collaboration and strengthens the impact of research and innovation in developing, supporting, and implementing EU policies, while also addressing global challenges. The program aims to create and disperse high-quality knowledge and technologies, generate new job opportunities, utilize the EU's talent pool, drive economic growth and enhance

industrial competitiveness while also optimizing investment impact within the European Research Area. The countries that have received the most funding include Germany, Spain, Finland, France, and Norway, with approximately 90% of funds going to entities registered in the EU, including the UK for Horizon 2020 funding. In total, entities from 57 countries have received some form of funding from Horizon.

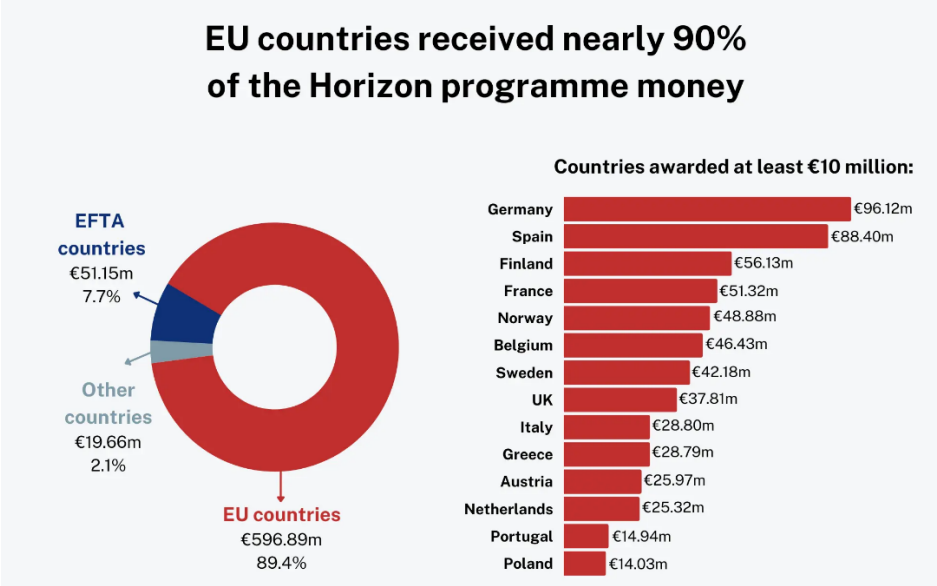

Figure 45. EU Horizon Program (Source: Investigate Europe).

Since 2014, 95 projects have been funded, and millions have gone to companies accused of environmental misconduct. For example, France's **Eramet**, which has received €1.9 million for four projects through Horizon, has faced allegations of destroying forests and land belonging to indigenous communities in Indonesia, due to the development of Weda Bay, which is the world's largest nickel mine. Similarly, Anglo American, based in the UK, has received just over €200,000 from a Horizon project, but is currently facing a class-action lawsuit for the mass lead poisoning of children in Zambia. The company has also faced allegations of pollution in Brazil and other countries. More than a dozen companies that have received Horizon funds for projects related to the green transition have also been accused of environmental wrongdoing. While Horizon Europe does not support nor condone this type of behavior, they have not commented on why companies accused of misconduct have received significant funding. The EU is preparing a new regulation to promote environmental, social and governance (ESG) factors in investment decisions. This energy-

induced transformation of commodity trade can further integrate environmental costs and eliminate compliance, transparency and adverse selection issues.

Figure 46. A nickel mine in Indonesia. French firm Eramet has faced allegations of wrongdoing at its projects in the country (Source: Investigate Europe).

Therefore, it is clear that, despite the 11 existing sanctions packages, Europe continues to heavily import nickel, copper, and titanium from both China and Russia. As an example, Soil Machine Dynamics, a leading underwater robotics company, received €3.53 million from Horizon's budget to fund the Vamos project, which aimed to develop a new technique for extracting minerals from previously unreachable depths. The project started on February 1, 2015, and just five days later, the private equity fund Inflexion announced that it had sold the UK company to Zhuzhou CSR Times Electric. Aughinish Alumina is a company based in Ireland that is owned by Rusal, a Russian company that dominates the industry. The company specializes in refining bauxite, the rock from which alumina is extracted to produce aluminum. Aughinish Alumina received €563,500 for its participation in a project that aimed to investigate ways "to render bauxite residue reuse viable from an economic standpoint and acceptable for the industry" (Rico Buzzoni, 2023).

The majority of the nations participating in the Horizon Program hail from the EU, with a few exceptions. One such exception is Lancaster Exploration Limited, a company headquartered in the British Virgin Islands. They took part in a venture focused on developing innovative "exploration models for alkaline and carbonatite provinces" to benefit Europe's advanced technology sector. Lancaster is known for their expertise in rare earth exploration in Africa, and they were granted over €168,000 from the Horizon fund for their involvement.

In addition to organizations participating in the Horizon Europe program, the oil and gas industry also experienced unprecedented growth, despite the negative impacts on millions of people. The driving force behind the industry's immense profits is the first truly global energy crisis. This was triggered by Russia's aggression towards Ukraine, causing wholesale gas prices to soar and leading to record profits for oil and gas companies. UN Secretary-General Guterres expressed concern, stating that these companies "hold humanity's fate in their hands".

Company	Profit 2021	Profit 2022
ExxonMobil	$23B	$59.1B
Shell	$19.3B	$39.9B
Chevron	$15.6B	$36.5B
TotalEnergies	$18.1B	$36.2B
BP	$12.8B	$27.7B

Figure 47. Five big oil companies' profits in 2021 and 2022 (Source: Investigate Europe).

In 2022, the top five integrated private sector oil and gas companies namely **Chevron**, **ExxonMobil**, **Shell**, **BP** and **TotalEnergies**, reported annual profits amounting to $195 billion, which is an increase of almost 120% from the previous year, and the highest in the industry's history. Among them, ExxonMobil took the lead with a net income of $59 billion, the most they have ever made in their 152-year existence, nearly 1.5 times higher than their profits in 2021. These sudden and substantial increases in financial returns, known as excess profits or windfall profits, are not a result of the companies' actions but external events, and can potentially be subjected to windfall taxes. Similar to the European Union's approach, profits

are considered excess if they exceed 20% of the average return from the previous four years (2018-2021). According to this method, the combined excess profits of Chevron, ExxonMobil, Shell, BP, and TotalEnergies in 2022 were $134 billion, largely driven by the repercussions of the conflict in Ukraine (Global Witness, 2023).

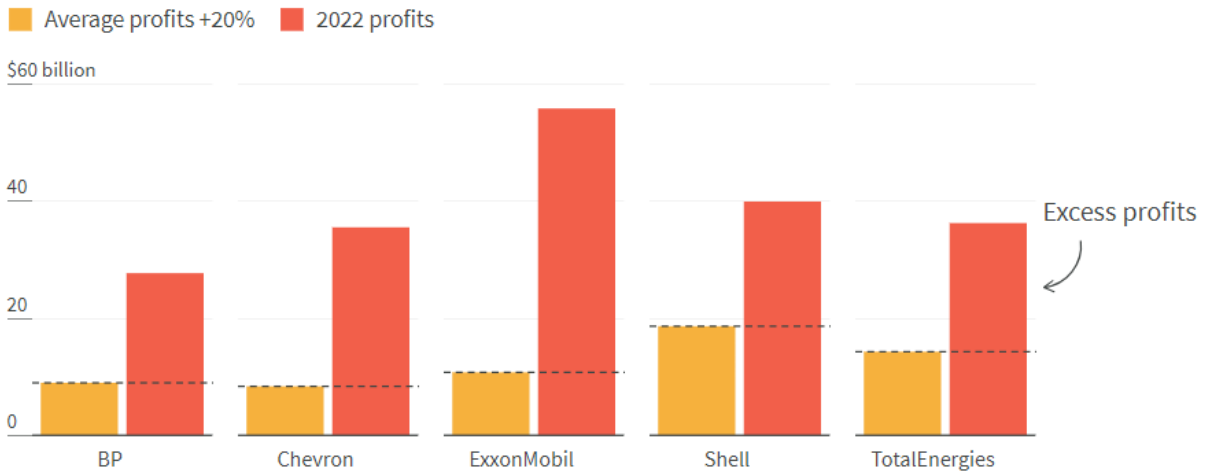

Figure 48. Western majors gained more than $130 billion in 2022 excess profit (Source: Global Witness).

What remains to be determined is how to allocate these excess profits. Rather than benefiting a select few wealthy individuals and companies, these windfall profits from the oil and gas industry could be directed towards mitigating the effects of potential crises. The amount could also be used to fund close to 40% of Ukraine's total reconstruction costs, which are estimated at $349 billion by the World Bank. Additionally, considering that the oil and gas industry is a major contributor to climate change, their excess of $134 billion could cover four-fifths of the $168 billion in damages caused by the top 10 most severe climate-related natural disasters in 2022 (Global Witness, 2023).

However, it is important to acknowledge that a significant portion of these excess profits will ultimately benefit the shareholders. The five oil and gas corporations distributed a total of $102 billion in profits to their investors, with $48 billion in dividends and $54 billion spent on share repurchases. This tactic is a commonly used, yet controversial method to boost shareholder value. Chevron proudly announced their record profits in 2022, stating that they prioritized "returning cash to shareholders, investing capital efficiently, and paying down debt." In reality, the industry's claims of being environmentally friendly are largely unsubstantiated, as the International Energy Agency (IEA) predicts that clean energy

investments will make up only 5% of the oil and gas sector's capital expenditures in upstream energy production in 2022. This leaves 95% of investments for traditional oil and gas extraction (Global Witness, 2023).

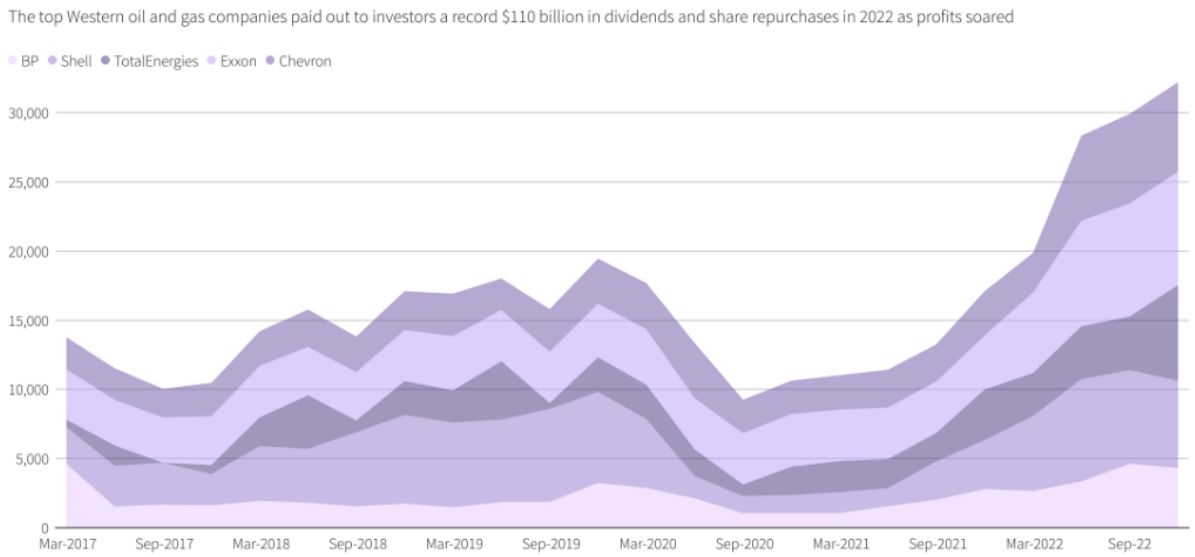

Figure 49. Big Oil's shareholder returns (Source: Reuters).

It can be concluded that while many companies across the globe faced challenges due to rising prices of raw materials, there were others involved in the exploration and development of new commodities and mining sites and technologies, as well as their shareholders, who benefitted from the situation and received significant funding from international entities.

4.4 PROPOSED MEASURES

Given the scenario, companies would be wise to take a different approach to the use of resources, so that they are less tied to fluctuations in the raw materials market. Several proposals have been advanced to face the disruption of the supply chains on which companies have relied for decades.

At a larger scale, the primary solutions being pursued by several countries align with those proposed in the European Raw Materials Act. One of these focuses on implementing a circular economy, where waste is no longer disposed of but reused in the production cycle. This allows for an increase in the use of renewable energy and a redesign of processes to

minimize waste. Another strategy is to shift towards deglobalization, where activities that are typically carried out by external entities are instead done in-house, and local markets are encouraged to promote greater autonomy and flexibility (COSMAN, 2022). However, even with these efforts, the European Union will never achieve complete self-sufficiency in raw materials supply, but it would be beneficial to establish a strategy for securing the most critical resources. The EU must exercise its open strategic autonomy, acknowledging the vital role of Micro and Small Enterprises in the European value chain. This involves creating a policy for the sustainable and secure provision of energy and raw materials, by collaborating with businesses, regional and national authorities and institutions. The focus should be on the circular use of resources. The EU could even lead joint purchases of raw materials, similar to the approach taken during the pandemic for the acquisition of vaccines and face masks (Hendrickx, 2021).

When examining the situation on a smaller scale, it is highly advised that companies, especially small and medium-sized enterprises, avoid proposing fixed price contracts. This is due to the fact that prices for raw materials and logistics are still quite volatile. Instead, companies should consider offering contracts with adjustable prices to account for fluctuations in raw material costs. In general, contracts that rely on the availability of raw materials should include a clause regarding unforeseen circumstances or force majeure. Conversely, customers should not take advantage of the supplier's challenges or impose penalties for delays caused by raw material shortages. To protect themselves, manufacturers would benefit from aligning their trading strategies with current pricing trends. This may involve aggressively seeking alternative suppliers with better pricing or closer proximity to operations in order to reduce delivery costs (PwC, 2022). This can also mitigate the impact of disruptions in the supply chain. According to a 2022 survey, 46% of companies have already implemented or plan to implement dual sourcing for critical components and raw materials, sometimes at the expense of product quality. Additionally, manufacturers should consider extending their profit coverage indemnity period. This is important because supply chain issues, such as delays caused by extreme weather events or raw material shortages, can result in longer downtime for manufacturers, and as per the Sovereign Insurance principle they need to be indemnified. With this in mind, it is important for companies to explore different options to mitigate potential supply chain disruptions, with a focus on risk

reduction strategies such as diversifying sourcing. The following steps resume what countries at a macro level and companies at a micro level should do:

- Trying to reduce dependance on a single supplier: exclusive supply contracts guarantee both supplier and customer loyalty, but in times of crisis they don't always work.
- Evaluating different supply markets: the reshoring phenomenon within European boundaries may encourage the search for new suppliers in areas not yet discovered.
- Mapping the presence of alternative suppliers: ad-hoc market analysis may help to select suppliers having specific characteristics.

In order to address this situation, various suggestions have been put forth, all with the common goal of diversifying sourcing to minimize risk. It is crucial for companies to actively search for ways to reduce potential disruptions in the supply chain, incorporating risk-reducing strategies into their overall supply chain optimization. This may involve exploring methods to optimize or modify manufacturing processes to decrease dependence on specific raw materials, or finding more cost-effective and readily available alternatives. Companies also need to closely monitor the factors that affect raw material prices. By staying informed and conducting scenario planning exercises, companies can anticipate potential fluctuations in prices and proactively develop strategies to mitigate risks and adjust to changing market conditions. Lastly, adopting sustainable business practices is an effective way for organizations to minimize the impact of high raw material costs. Implementing strategies such as waste reduction, recycling, and resource efficiency can reduce the consumption of raw materials. By incorporating renewable or recycled materials and embracing energy and water-efficient processing, companies can also contribute to sustainable practices, making them more attractive to environmentally conscious consumers. Ultimately, it is crucial for companies to adapt and evolve their practices in response to market conditions and incorporate sustainable practices in their operations to minimize risks and maintain a competitive edge. Therefore, it is important for companies to prioritize strategies that reduce reliance on traditional raw materials and embrace more sustainable alternatives in order to navigate fluctuating market conditions (Tracc).

When it comes to raw material costs, the only constant is **change**. The global business climate will remain uncertain for the foreseeable future, and companies that are able to

adapt to and thrive in uncertainty are the ones that will survive. To deal with raw material cost fluctuations and remain competitive, organizations have to embrace new ways of working. From rethinking and optimizing their supplier relationships and supply chains, to adopt environmentally friendly manufacturing practices, opportunities are endless.

4.5 EU-CHINA SUPPLY CHAIN: 3 POSSIBLE SCENARIOS

The European Union heavily relies on non-EU nations, mainly China, for the majority of its mineral resources. China supplied 44% of crucial raw materials to Europe between 2012 and 2016. China's involvement in all steps of the mineral supply chain, particularly in smelting and refining, makes it a key player. It currently dominates almost half of the world's refinery production. However, with disruptions in the supply chain and a push for Europe to decrease its dependence on foreign imports, the relationship between the two countries may shift, creating potential for various outcomes.

In its current state, Europe will continue to **rely on China** for its supply of raw materials. China's "dual circulation" policy, which focuses on strengthening the domestic market while also promoting foreign trade, has been successful. This means that China's economy is becoming less reliant on foreign demand by 2027. The future of China's relationship with the EU remains uncertain, as they are currently the EU's second largest trading partner, but there are ongoing conflicts between the two. To decrease dependence on China, the EU has invested significant amounts of money into its domestic mining and processing sector. In fact, essential raw materials such as lithium and rare earths are already partially mined in Europe and there is a growing emphasis on recycling. These efforts are part of the EU's Critical Raw Materials Act, which was introduced in the early 2020s. Despite its efforts to reduce dependence on China, the EU still relies on them for certain critical raw materials, such as rare earths. However, Chinese mineral resources are costly and their prices can be unpredictable. To meet the requirements of their "two cycles" policy and their own climate goals, China has implemented export limitations. Additionally, China's social and labor standards do not meet the high standards set by the EU. While the EU's raw material partnership approach has brought both opportunities and risks to European-Chinese supply chains, it has also prompted the EU to explore alternative supply chains. Investments and cooperative agreements in research and technology have also led to

advancements in eco-friendly extraction and processing methods for raw materials. Additionally, strengthening the EU's domestic raw material sector itself could lead to negative environmental and social impacts if not properly regulated. Despite efforts to reduce reliance on China, the EU could face criticism for compromising sustainability standards when trading with China. Moreover, reshoring the supply chain to Europe could also bring about environmental risks and face opposition from the local community. There is also a risk of negative environmental and social impacts if the EU's domestic raw material sector is not effectively regulated.

However, there is also potential for a scenario where sustainability and supply security are achieved through **cooperation**. The Covid-19 pandemic served as a lesson to China, showing that even the strongest economies can benefit from outside aid. In this scenario, the "dual circulation" approach is replaced by a new strategy called "Reopen China", which aims to foster cooperation with Europe and other Asian nations. Beijing may show more willingness to collaborate on issues such as climate change and establishing sustainable supply chains. The EU-China Special Summit in 2028 serves as a turning point towards this new approach, with mutual sanctions being revoked and a comprehensive trade agreement solidified for the trade of raw materials between the EU and China. By 2030, raw material supply chains are expected to be more sustainable compared to previous years, leading to increased supply security within the EU. The current level of raw material imports from China is considered manageable due to the cooperative and stable relationship between the two regions. This brings both opportunities and risks. On one hand, mutual interests and collaborative efforts have significantly improved supply security and sustainability in European-Chinese raw material supply chains. However, there is still a high risk of clustered supply chain disruptions, and the EU's domestic mining and recycling efforts have not met initial expectations, despite the potential for more efficient use of primary raw materials.

The final scenario considers the possibility that **politics and economics become disjointed**. In China, there are widespread protests against a restrictive and oppressive government, which are harshly suppressed. As a result, the EU, along with other international partners, imposes sanctions on the PRC. In retaliation, Beijing imposes trade restrictions and an export ban on rare earths. The strained relationship with China and ongoing domestic issues lead the EU to worry about its supply security for raw materials.

Therefore, they strengthen partnerships with strategic and trustworthy countries, including Australia, Canada, and select nations in Latin America and Africa. The unstable global climate has resulted in consistently high prices for commodities. These prices cannot be stabilized by local mining or agreements with commodity partners. The EU has found potential in forming new partnerships to ensure greater access and reliability. In an effort to decrease its reliance on imported raw materials, the EU has also invested heavily in extracting, utilizing, and recycling raw materials. However, shifting leadership in China and an unpredictable global market has caused supply bottlenecks and disrupted trade. Additionally, the demand for quick supply has led to a rise in human rights violations in commodity supply chains, with lowered social and labor standards and shortened environmental assessments (Carry Godehardt Müller, 2023).

CONCLUSIONS

To conclude, the impact of rising raw material costs on businesses, particularly in the context of the China-Africa relationship, has been significant and multifaceted. The causes of the supply tensions are multiple and can be explained by both demand and supply factors. One of the main reasons is the rapid and intense **economic recovery** after the first impact of the Covid-19 pandemic, as well as the pressures exerted by the large international investments in commodity markets and the effects of the twin **digital and green transition**. The increasing demand for raw materials from China, coupled with the rapid economic growth in Africa, has led to a surge in prices, posing challenges for companies operating in various industries. Firstly, the **rising costs of raw materials** have had a direct impact on the profitability of businesses. As the prices of key inputs such as oil, metals, and agricultural commodities have soared, companies have been forced to either absorb the higher costs or pass them on to consumers. This has squeezed profit margins and put pressure on businesses to find innovative ways to mitigate the impact of rising costs. Secondly, the **China-Africa relationship** has played a crucial role in shaping the dynamics of raw material prices. China's insatiable appetite for resources has driven up demand, creating a seller's market for African countries rich in natural resources. While this has brought economic benefits to some African nations, it has also exposed them to the volatility of global commodity markets. Fluctuations in demand from China, as well as changes in government policies and regulations, have led to price volatility, making it challenging for businesses to plan and forecast their raw material costs.

The China-Africa relationship has not only impacted the prices of raw materials, it has also influenced the **availability** and **accessibility** of these resources. Chinese investments in African countries have often been accompanied by infrastructure development projects, such as roads, railways, and ports, aimed at facilitating the extraction and transportation of raw materials. While these investments have improved connectivity and trade between China and Africa, they have also raised concerns about resource exploitation and environmental sustainability. Companies operating in these regions must navigate the complex social, political, and environmental landscape to ensure responsible sourcing and sustainable business practices.

Moreover, the China-Africa relationship has also brought about **opportunities** for collaboration and innovation. Chinese companies have increasingly sought partnerships with

African businesses to secure a stable supply of raw materials and gain access to new markets. This has led to knowledge transfer, technology sharing, and capacity building, which can enhance the competitiveness and resilience of African industries. However, it is essential for African businesses to negotiate fair and equitable terms in these partnerships to avoid becoming overly dependent on Chinese companies and to ensure that the benefits are shared equitably.

To conclude, the increase in raw material costs and the evolving China-Africa relationship have had a profound impact on businesses. The rising prices of raw materials have strained profit margins and forced companies to find ways to mitigate the impact. The China-Africa relationship has influenced the dynamics of raw material prices, availability, and accessibility, presenting both challenges and opportunities for businesses operating in these regions. In this scenario, it is crucial for companies to adopt strategies that promote responsible sourcing, sustainable practices, and equitable partnerships to navigate the complexities of the global raw material market and ensure long-term success. The dynamics of the world economy depends mostly on how relations between China and Africa will evolve, and how other countries will react to these new dynamics.

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