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The future of European-Chinese raw material supply chains: Three scenarios for 2030 and their implications

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The Future of European-Chinese Raw Material Supply Chains

Three scenarios for 2030 and their implications

Inga Carry, Nadine Godehardt and Melanie Müller

When it comes to being supplied with raw materials, Europe faces a number of challenges. These include the diversification of European supply chains, the implementation of effective sustainability standards, and the reduction of strategic dependencies on China. What will European-Chinese raw material supply chains look like in 2030? This paper outlines three possible scenarios, illustrating the combined effects of different political and socio-economic developments and the impact they could have on European-Chinese supply chains. It aims to help political actors gain a deeper understanding of possible future trajectories and map out appropriate policy strategies in response to different scenarios.

The invasion of Ukraine has exposed Germany's dependence on Russian energy exports. Leading the largest European economy, the German government has been scrambling to find new ways to secure energy sources beyond Moscow as the public debate around other dependencies on the import of (non-energy) raw materials from authoritarian states has intensified — with China being the elephant in the room. Although the People's Republic remained Germany's largest trading partner in 2022, its political reputation among Germans has suffered considerably. Germany and the EU are increasingly critical of Chinese leadership under Xi Jinping, which is furthered by China's confrontational foreign policy, its "admonishing neutrality" vis-à-vis Russia's invasion of Ukraine, its human rights viola-

tions in Xinjiang, and its controversial zero-Covid policy — including its abrupt end.

Future dealings with China will likely be influenced by the current experience with Russia. For Germany and the EU to avoid going down this road again, strategic dependencies on China will need to be reduced, even if individual member states express different priorities. After all, over the last twenty years, the People's Republic has established supremacy in mineral raw materials, especially metals and industrial metals.

Central dependency on China

The EU sources the majority of its mineral raw materials from non-EU countries, primarily China. Between 2012 and 2016,



44 per cent of the thirty raw materials that the EU classifies as “critical” were imported from China; according to the EU’s latest data, around 98 per cent of the EU’s demand for rare earths is met by China. As part of Beijing’s Belt and Road Initiative (BRI), Chinese state-owned enterprises are increasingly investing in the global mining of raw materials, also with the aim of meeting China’s own domestic demand. In addition, Beijing has concluded strategic agreements with other governments that facilitate Chinese state-owned companies’ access to raw materials; at the same time, raw materials projects are being specifically promoted with loans from Chinese banks.

China has become a central player at all stages of the mineral supply chain, particularly in smelting and refining. The country controls almost half of the world’s refinery production. Chinese actors now link raw material extraction sites — often located in the so-called Global South — with countries where industrial processing takes place. By comparison, smelting and refining hardly take place in the EU anymore, resulting in its dependence on China.

European industrial actors face a considerable “cluster risk” when it comes to the supply of refined products, the impacts of which have been visible since 2021. At this time, due to energy-saving measures in the Chinese provinces of Shaanxi and Shanxi, certain magnesium smelters were forced to cut their production. This led to a global shortage of magnesium, skyrocketing its price by 260 per cent. As this example illustrates, local occurrences in China can have immediate consequences for the global economy.

European-Chinese raw material supply chains in 2030

Future scenarios outline a variety of possible developments based on a fixed set of drivers. Unlike forecasts, scenarios are not based on the probability that a future development might occur; rather they are based on the plausibility and internal coherence

of certain sequences of events. The following three scenarios build upon the outcomes of a two-day foresight workshop on the future of European-Chinese raw materials supply chains that incorporated perspectives of stakeholders from administration, business, and academia. All scenarios are based on two assumptions: First, that the demand for raw materials in Europe and the world will remain high in 2030; and second, that the EU will be heavily dependent on imports of mineral raw materials, even if its own extraction and processing capacities were to increase.

At the front and centre of all of the scenarios is the interplay between security of supply, sustainability, geopolitics, and geo-economics. The scenarios are based on six drivers that were identified as central to the future of European-Chinese raw material supply chains. They concern economic and political developments in China and the EU as well as China’s position within the international community. Other factors such as the Sino-American rivalry, security in East Asia, and the impact of climate change on the extraction and processing of mineral raw materials certainly also played a role, albeit to a lesser extent. The six drivers are:

1. Political and socio-economic development within China, also with regard to sustainability;
2. Europe’s relations with China (in general as well as specifically in the area of raw materials);
3. Location and logistical risks (in China and emanating from Chinese policy);
4. Status of diversification of European raw material supply chains (analysed together with the second driver);
5. Development of the relative price level and price volatility of Chinese raw materials;
6. Relevance and effectiveness of sustainability standards (in the EU, China, and globally).

In terms of explanatory power, the first driver (internal developments within China) played the most important role in determining the future of European-Chinese raw

material supply chains. Correspondingly, the analysis of the second factor (Europe's relations with China) showed that the EU primarily acted reactively, specifically with regard to the nature of raw material supply chains. The fourth driver (the state of diversification of European supply chains) strongly correlated with the EU's overall relations with China, therefore — as noted above — it was combined with the second driver in the analysis.

Scenario 1: The status quo is consolidated

Developments within China: Under this scenario, the 21st National Congress of the Communist Party of China (CPC) in October 2027 reconfirms the leadership of state and party leader Xi Jinping. No intra-party faction is influential enough to break his power. The “dual circulation” policy, i.e. the strengthening and promotion of the domestic market paired with a complementary foreign trade policy, has proven successful. The country's domestic market is growing, meaning that China's economy is less dependent on foreign demand in 2027. In some sectors, the People's Republic has established itself as a leading technological power. It is therefore self-confident, especially vis-à-vis liberal Western countries. The Chinese path is seen as a success story, thereby giving rise to a strong sense of national pride. At the same time, Beijing continues to focus on preserving the sovereignty, territorial integrity, and national security of the Chinese state.

Independent of international regimes, China has designed and implemented its own standards for sustainability and due diligence in supply chains. The government is launching global initiatives (such as the Global Climate and Due Diligence Initiative) to internationalise its own standards and guidelines. In doing so, China aims to strengthen its global leadership domestically and abroad.

European-Chinese relations and the EU's diversification strategy: Mistrust and uncertainty

prevail between Europe and the People's Republic. China is still the EU's second largest trading partner (after the United States), but there are numerous points of conflict between the two. Points of contention centre around China's restrictive economic policy, serious domestic human rights violations, and its claim to global leadership and resultant geopolitical tensions. These disputes are reflected in the new version of Europe's China strategy, in which Xi's China is viewed exclusively as a competitor and rival to the EU. Within this context, the EU aims to maintain economic relations with China in areas that are important for Europe — which primarily applies to raw materials trade.

In order to reduce dependency on China, and as part of its Critical Raw Materials Act launched in the early 2020s, the EU has invested large sums in the European mining and processing sector, for example by subsidising European mining companies. Thus, in 2030, important raw materials such as lithium and rare earths are partially mined in Europe while an increasing amount of raw materials are recycled. Additionally, more raw materials processing and refining now takes place either within the EU or in countries other than China, therefore the value chain of certain raw materials becomes increasingly detached from the People's Republic. Since the geopolitical crises of the early 2020s, the EU has also pursued its strategy of “friendshoring” — i.e. cooperating with “like-minded” and low-risk countries. In this way, it has revitalised raw material partnerships and built a global network of strategic partners. Even so, the EU's demand for certain critical raw materials, such as rare earths, has grown so much over the years that it continues to be dependent on supplies from China.

Location and logistical risks: Location and logistical risks with respect to China are rising. An increasing frequency of extreme weather events, problems in China's health-care system, and the overall demographic shift in the country all pose significant challenges for Chinese companies. However, the Chinese government is using all

means at its disposal to continue economic production.

Price level and volatility: Mineral raw materials from China are expensive and their price development is volatile. In order to cover its domestic needs, meet the requirements of the “two cycles” policy, and hit its own climate targets, the Chinese administration has repeatedly imposed export restrictions in recent years. This has led to a shortage of certain raw materials on the international market. In addition, energy shortages and natural disasters caused by climate change are becoming more frequent, forcing Beijing to increasingly counter such emergencies by way of cost-intensive subsidies and reconstructive measures. Additionally, China’s ongoing political tensions with the EU and US further increase the high price of raw materials.

Importance of sustainability standards: In the mid-2020s, the EU adopted a comprehensive supply chain due diligence law that is now being implemented by its member states. However, this law has substantial differences compared to similar regulations in China, which are less comprehensive, address only ecological standards, and strive to achieve CO₂ neutrality by 2060. In addition, smelting and refining in the People’s Republic is controlled by large state-owned enterprises, which adopt processes that often lack transparency. All this makes it difficult for European companies to trace their supply chains. The state of social and labour rights in China also does not meet the EU’s high standards. Thus, European civil society calls for the EU to completely or at least partially withdraw from China and instead focus on cooperating with countries that are willing to meet strict sustainability requirements. Raw material partnerships play a central role here as they offer other countries effective incentives to create sustainable supply chains.

The raw material partnership approach has created both opportunities and risks for European-Chinese raw material supply chains:

Opportunities: The EU has managed to reduce its dependency on Chinese raw

materials while strengthening its own security of supply. Raw material partnerships have opened up new supply chains and have increased sustainability standards in other countries. Investments and cooperative agreements in the field of research and technology have led to technological innovations that allow for more environmentally friendly raw materials extraction and processing.

Risks: The EU loses credibility as a global player because it allows exceptions to sustainability standards in trading with China. The increased “reshoring” of raw material supply chains to Europe also creates problems within the EU, for example by posing environmental risks and sparking social resistance within certain EU countries. Geopolitically, raw material partnerships and alliances of “friendly” states on the one hand and China’s strategic foreign policy on the other promote the formation of ideological blocs.

Scenario 2: Sustainability and security of supply are achieved through cooperation

Development within China: Under this scenario, the Chinese government faces a number of political and economic challenges throughout the 2020s. Increasingly long droughts as well as desertification cause food and water shortages. Uncontrolled Covid-19 outbreaks in the beginning of the decade have had long-term consequences, including a high number of “Long Covid” cases among 20- to 30-year-olds and an increase in youth unemployment of up to around 30 per cent in 2026. The expansion of the health care system, shortage of labour and skilled workers, and years of stagnating purchasing power are leading to massive losses in China’s economic output. Against this backdrop, new opposition forces are gaining strength within the CPC as the Party’s undisputed loyalty to Xi is broken. In the aftermath of the 21st Party Congress, Xi fades into the background and retains only the chairmanship of the

Central Military Commission. A rejuvenated leadership that is trying to push for economic and socio-political reforms is on the rise. The “dual circulation” approach is replaced by a new strategy — “Reopen China” — with the aim of ushering in a new era of cooperation with Europe and the Asian neighbourhood. At the international level, planetary challenges are moving to the centre of negotiations. Beijing is increasingly willing to cooperate on climate change and the creation of sustainable supply chains.

European-Chinese relations and the EU's diversification strategy: The drastic changes in China coupled with the prospect of a post-Xi People's Republic encourage European decision-makers to actively reengage Beijing. The EU-China Special Summit in the spring of 2028 marks this new beginning. Mutual sanctions are lifted and a delegation from the European Parliament travels to Xinjiang and Tibet. The jointly drafted summit declaration names specific lighthouse projects that centre on cooperation, particularly within the raw materials sector. Political stability and continued positive economic development in the EU have created favourable conditions for this. Trade in raw materials between the EU and China is consolidated through a comprehensive trade agreement.

Given improved relations with China, the EU now lacks the political will and necessary pressure from the civil society to advance a comprehensive diversification of European supply chains. In addition, several attempts to realise new mining projects and processing facilities within the EU have been abandoned due to resistance from local populations and also because of insufficient willingness to fund or invest in such projects.

Location and logistical risks: Location and logistical risks play only a minor role in European-Chinese raw material trade. The EU and China have established a joint Disaster Response Network to support each other with expertise, equipment, and specialist knowledge, particularly in the field of disaster prevention and the management

of extreme weather events. A new type of early warning system helps to maintain the reliability of production chains and infrastructure in most cases.

Importance of sustainability standards: Raw material supply chains are characterised by higher sustainability in 2030 than they were a few years ago. As a result, security of supply within the EU has also increased. While the share of the EU's raw material imports from China is still high, it is considered manageable given the current state of cooperative and stable relations. At the same time, both the EU and China recognise the need for climate protection and climate impact adaptation. In China, domestic non-governmental organisations (NGOs) are increasingly involved in discussions on sustainability and due diligence. In 2028, the former Sino-German Centre for Sustainable Development (CSD) was transformed into the European-Chinese Centre and, as the main platform for exchange between Chinese and European NGOs, has been developing joint guidelines for high sustainability standards.

Price level and volatility: There is little uncertainty in the commodity market; prices are high but stable. This is due to strong domestic and international demand and the implementation of strict sustainability standards. As long as these standards are met, consumers accept the increased prices.

Opportunities: Convergence of interests and consensual cooperation have resulted in a significant increase in both security of supply and sustainability in European-Chinese raw material supply chains. EU-China relations are setting a trend, leading to higher sustainability standards worldwide.

Risks: The EU's dependence on Chinese raw materials is stronger than ever, and the cluster risk remains high. The EU is ill-prepared for possible future risks, such as a change of leadership or instability in China. Intra-European mining is stagnating and progress in recycling has fallen far short of initial expectations, even though a steady supply of primary raw materials could be used more efficiently. The common goal of climate protection is primarily pursued

through CO₂ reductions in the raw materials sector.

Scenario 3: Politics and economics are decoupled

Development within China: According to this scenario, China is in permanent crisis mode by the end of the 2020s. Ongoing economic and financial crises, an overstrained health system, and extreme weather events batter the country. The ageing leadership under Xi appears at a loss and riots erupt across the country. While the People's Armed Police initially contain the unrest, brutal attacks by security forces culminate in the death of a twelve-year-old boy, thus triggering a spiral of violence that completely paralyses major cities like Shanghai, Shenzhen, and Qingdao. Within the CPC, the call to restore order grows louder. Some who were previously loyal to Xi publicly distance themselves from him and advocate for a stronger crackdown against the uprisings. A number of high-ranking cadres support the decision to deploy the People's Liberation Army to pacify key hotspots.

While the protests are violently suppressed, a small group of hardliners and military henchmen seize control of the political affairs of the country. Finally, the 21st Party Congress officially seals the end of the Xi era. As a result, the human rights situation in the country severely deteriorates. A digital control system is introduced, which – similar to the times of the zero-Covid policy – starkly restricts people's zones of activity. Foreign journalists are forced to leave China. Freedom of speech is increasingly restricted, and the state's interference in the private lives of the population intensifies.

European-Chinese relations and the EU's diversification strategy: In response to the Chinese leadership's domestic repression, the EU, in coordination with international partners, imposes sanctions against the People's Republic. For its part, Beijing reacts with trade restrictions and an export ban on rare earths, partly because the Chinese military

now prioritises national supply. While increasingly hostile towards Western industrialised countries, Chinese leadership strengthens its alliances with autocracies and dictatorships worldwide and openly proclaims China's immanent reunification with Taiwan at any price.

The tense relations with China and the ongoing crises at home cause the EU to fear for its security of supply of raw materials. Consequently, it strengthens raw material partnerships with strategic and – in its eyes – trustworthy actors such as Australia, Canada, and select countries in Latin America and Africa. At the same time, the EU pushes ahead with mining and raw materials processing operations in its own member states. Massive financial resources are made available in order to diversify supply chains; the EU's Global Gateway Initiative is expanded into the European Infrastructure Resilience Initiative.

Location and logistical risks: China's political and economic instability contributes to high location and logistical risks. Waves of arrests, unrest, and natural disasters repeatedly interrupt supply.

Price level and volatility: The overall unstable situation leads to volatile and persistently high commodity prices worldwide. The prices can be cushioned neither by domestic mining nor by agreements with commodity partners.

Importance of sustainability standards: Sustainability no longer plays a role in Chinese decision making; in many ways, social and ecological standards have deteriorated even further. Pressure from civil society in EU member states causes European and Chinese companies to partly suspend their relations, resulting in significant losses for the European economy. Concerns about potential shortages in the supply of key raw materials override initiatives for more sustainability in global supply chains. The EU Corporate Sustainability Due Diligence Directive is ultimately put on hold while the EU focuses on finding new sources of raw materials.

Opportunities: The EU can offset temporary supply shortages of important raw

materials by diversifying its sources of supply. New partnerships have emerged out of necessity, providing the EU with greater access and predictability. In order to reduce its dependence on raw material imports, the EU has also initiated massive investments in raw material extraction and use as well as recycling.

Risks: The unstable situation and the change of leadership in China disrupt global trade flows and cause many countries to experience supply bottlenecks. The resulting need to tap new sources of raw materials fuels competition – between geopolitical blocs and between existing alliances. Meanwhile, efforts to pursue sustainability strategies have been completely benched. The high global demand for quick supply causes severe increases in human rights violations in many commodity supply chains, as social and labour standards are dismantled and environmental assessment procedures shortened. This, in turn, has a negative impact on the security of supply, as strikes and protests in the raw materials sector are on the rise worldwide, jeopardising mining projects. The EU's energy transition stagnates due to a lack of necessary raw materials. Because of the sanctions against China, European countries are experiencing considerable economic slumps and a loss in prosperity.

Policy recommendations

These three scenarios illustrate the need for EU policy makers to consider a wide range of factors when devising viable and long-term strategies for the security of supply in mineral supply chains. They show that internal developments within China are a central factor in shaping European-Chinese (raw material) relations. In light of this, European policy makers and companies must work towards strengthening their own China competence through strategic analyses in order to be prepared for different situations and future trajectories. The ability to decode the Chinese debate is crucial. This includes following and recognis-

ing how Beijing's guidelines, laws, and plans on sustainable development and due diligence develop over time, to what extent they deviate from EU regulations, and how China strategically shapes its raw materials policy.

Policy makers in the EU cannot actively influence the course of events in China, but they can certainly increase the resilience of Europe's raw materials supply chains by preparing for different scenarios. The European Commission's proposal for a Critical Raw Materials Act is an important impetus for developing a viable strategy to ensure Europe's supply of raw materials in the long-term. When implementing such a strategy, policy makers should keep the scenarios illustrated here in mind.

Scenario 1 outlines how a policy of "reshoring" to the EU might cause environmental and sustainability risks as well as problems with EU populations that are not amenable to these changes. Consequently, the EU should not only focus on whether raw material projects within Europe are technically feasible, but it should also initiate a social debate on raw material extraction in Europe while guaranteeing the implementation of high sustainability standards. The EU should also specifically counteract the formation of ideological or economic blocs when pursuing its "friendshoring" strategy in the raw materials sector. Beyond fostering partnerships with the states that are already implementing high standards, the EU should make offers to states that are presently not (financially) capable, but that are willing to improve conditions in the extractive sector. To this end, the EU could offer to support governance reforms, thereby creating incentives for governments to implement sustainability standards in exchange for the prospect of increased cooperation in the extractive sector.

Scenario 2 illustrates that the EU cannot rely on positive developments within China, but should pursue approaches for diversification and the circular economy independently from its relations with the People's Republic. This does not mean that

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it should aim to completely decouple from China, which would be neither realistic nor politically expedient. Rather, the EU should identify strategically relevant sectors, determine the respective raw material needs, and reduce the cluster risk accordingly.

Scenario 3 demonstrates that the EU must actively work to embed and implement high sustainability standards and due diligence along global supply chains. Sustainability is a fundamental element of security of supply and supply chain resilience. The EU must safeguard this principle and ensure that human rights and environmental standards are respected even in times of crisis. The implementation of the European Corporate Sustainability Due Diligence Directive offers the opportunity to create a level playing field for European companies. Furthermore, the EU should actively engage in UN negotiations to create binding and globally applicable due diligence obligations.

Even if European-Chinese relations were to further deteriorate, the EU must still work towards maintaining a lifeline of contact with the political apparatus of the People's Republic and continue to use official channels of communication. It is therefore important to identify strategic access points to the regime in Beijing. Existing platforms such as the German-Chinese Centre for Sustainable Development should be used to guarantee the flow of information out of China – even in times of crisis.

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