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Marketing material

Critical minerals – The power factor in commodities

Critical minerals are increasingly playing a key role in the development of electromobility, renewable energy and digitalization – and thus in shaping future developments.

IN A NUTSHELL

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- Critical minerals are better understood as a structural theme than a cyclical commodity trend, given their role in key technologies and their distinct market structure.
- The decisive bottlenecks tend to arise less in mining than in refining and downstream processing, resulting in a high degree of technological and geopolitical concentration along the value chain.
- For investors, we think the key long-term implication may lie less in short-term price moves and more in structurally constrained and strategically important segments of the value chain.

Executive Summary

Critical minerals are in high demand – reflecting broader geopolitical dynamics that are also evident in recent conflicts so much so that recent geopolitical conflicts revolve around them. Their emergence, especially in the case of rare earth elements, is more than a development in the traditional commodities market; it represents a structural turning point. They are essential for electrification, digitalization, and security applications. Substitutability is limited and value chains characterized by high barriers to entry, both technological and regulatory. Against this backdrop, critical minerals are becoming increasingly central to economic and security-policy strategies.

The fact that critical minerals have become both essential and irreplaceable suggests we are witnessing a simultaneous, multidimensional demand shock. The energy transition is increasing the structural demand for metals used in electric motors, wind power and electricity grids. In parallel, the expansion of digital and AI-based infrastructures is pushing up the demand for grid infrastructure and specialized intermediate products. A further factor is security policy. Modern defenses and aerospace systems depend on high-performance magnets and other components that also rely on rare earth elements. These three axes of demand are largely independent of one another, politically supported and long-term – short-term cyclical weakness in individual end markets does not mitigate the structural challenge.

While demand is robust, supply is inelastic. Many rare earths and other critical minerals are scarce and require complex, capital-intensive and environmentally burdensome processing. The main bottleneck is not mining but downstream value-added stages, particularly refining, separation and permanent magnet production. Over decades these segments have developed an extreme geographical and technological concentration that can only be unwound slowly, even with ambitious investment programs.

This concentration gives critical minerals a geopolitical significance that goes far beyond traditional trade dependencies. China controls not only major portions of extraction but, above all, the technologically sensitive and value-intensive stages of the supply chain. For heavy rare earth elements, there are hardly any industrial alternatives outside China. Export controls, licensing regimes, and technology restrictions have turned critical minerals into a strategic instrument of power. The structural vulnerability of Europe and the United States can be reduced only gradually, even with strong support for a proactive industrial policy.

For capital markets this creates a tension between short-term market prices and long-term security of supply. Prices for some minerals are currently low or volatile but are not accurate reflections of the lack of supply security, while the incentive prices required for new projects outside existing centers of control are significantly higher. For investors, this suggests looking beyond broad commodity price trends and focusing on where bottlenecks and pricing power sit along the value chain. In that framing, mining and processing firms with secure access to strategic resources, technological capability and credible counterparties could be relatively better positioned to capture long-term demand, even if the path is volatile.

Overall, we conclude that the rise of critical minerals is not evidence of a new commodity supercycle but of a lasting structural transformation. They mark the transition from a traditional to a digital economy and from a focus on globalized efficiency to an economic order in which resilience, redundancy and strategic control again become central principles – with far-reaching implications for geopolitics, industrial policy and long-term capital allocation.

1 / Critical minerals vs. traditional commodities

1.1 Which raw materials are classified as "critical minerals" – and what are they used for?

We define critical minerals as a group of raw materials that have become indispensable foundations for many future-oriented technologies. These include metals and minerals without which neither modern batteries nor semiconductors, power grids, electric motors, nor digital infrastructure would function. Their supply is particularly vulnerable because mining and processing occur in only a few locations worldwide. Critical minerals include lithium, nickel, cobalt, graphite and copper, as well as more specialized metals such as gallium, germanium, tungsten or vanadium. In addition, there are the so-called rare earth elements – a group of 17 elements with exceptional magnetic and electrical properties.[1]

Lithium, nickel and cobalt form the basis of high-performance batteries and thus of electromobility and stationary energy storage. Graphite is indispensable for the anodes of modern battery cells. Copper quite literally keeps the energy transition running: it conducts electricity in wind turbines, solar panels, charging infrastructure and digital networks. Gallium and germanium, in turn, are essential building blocks for semiconductor and fiber-optic technologies, without which data centers, AI applications and telecommunications networks could not operate. And rare earth elements enable the production of particularly powerful permanent magnets used in electric motors, wind turbine generators, precision sensors and many systems relevant to national security.[2]

Taken together, critical minerals form the "material basis" of the green transition, digitalization and numerous applications in security and defense. They are the inconspicuous but decisive components of technologies that shape our daily lives and, in all likelihood, will also shape our future. That is why they have moved to the center of economic and political attention.

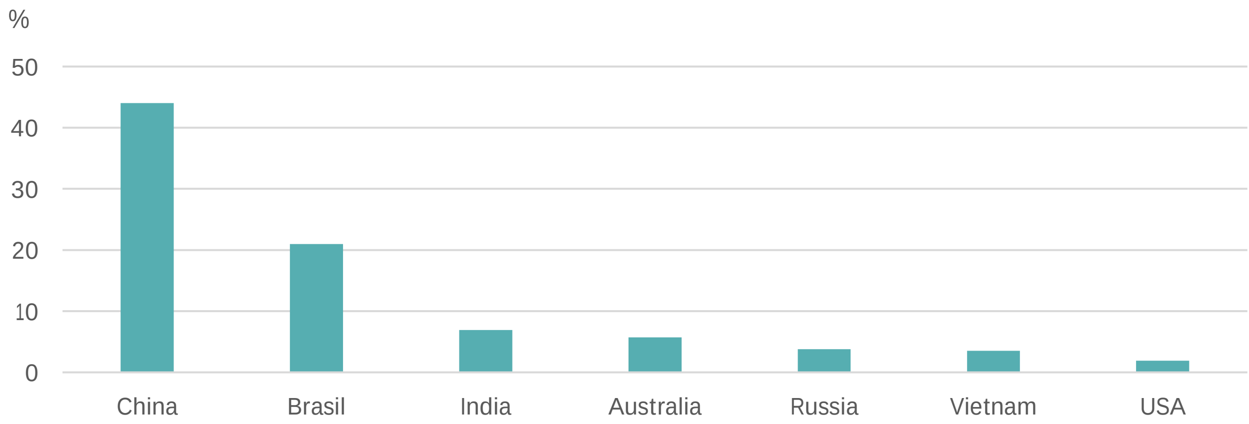
1.2 Where are the world's main deposits of critical minerals found?

Many critical minerals are widespread in the Earth's crust, but economically viable deposits are rare and geographically concentrated. The locations in which they are found determine the level of dependency on specific countries or regions.

[1] World Resources Institute, The Critical Minerals Conundrum: What You Should Know as of 10/8/25
[2] BBC, What are critical minerals and why do countries need them? as of 2/5/26

Rare earth elements illustrate this pattern particularly clearly. Major deposits are located in China, Vietnam, Brazil and the United States, while Europe has long had few economically usable resources.[3] Only recently has the Fen Complex in Norway brought Europe more into focus.[4] Deposits vary significantly in composition. Light rare earths are comparatively common, whereas the heavy elements required for high-performance magnets, such as dysprosium and terbium, occur only in a few places globally. China holds a large share of the deposits that are technically and economically feasible to develop, helping to explain its current dominance.

Global rare earth reserves* by country (% of total, 2024/25 USGS estimates)



* According to USGS, reserves are *that part of the mineral resource that can be economically extracted or produced at the time of determination.*
Sources: U.S. Geological Survey (USGS), Mineral Commodity Summaries 2024/25, DWS Investment GmbH as of April 2026

In recent months, however, one country has drawn particular attention: Greenland. According to current estimates, the island possesses some of the largest rare earth deposits outside China – especially the Kvanefjeld and Tanbreez sites, which together rank among the world's largest known deposits. Recent analyses suggest that Greenland contains around 1.5 million tonnes of rare earth elements and up to 25 of the minerals classified by the United States as economically or strategically critical. This has contributed to the region's growing prominence in international politics.[5]

This was especially evident in early 2026 when the U.S. government under President Donald Trump revived its previously expressed interest in purchasing Greenland – this time with significantly greater determination. A U.S. special envoy was appointed to evaluate a formal acquisition proposal, while the United States simultaneously expanded its military presence and resource strategy in the Arctic. NATO partners expressed irritation as Denmark had no wish to cede the island to the U.S. and Greenlanders too resisted the U.S. proposal. The U.S. sought to justify its initiative by claiming the acquisition was needed to "stay ahead" of China and Russia in the Arctic. Control over a critical supply of raw materials also likely played an important role.

One reason why Greenland's mining deposits have not been extensively developed, despite their potential, is the geological challenge involved. The deposits contain rare earth elements alongside uranium and thorium. Extraction would therefore inevitably involve the release of radioactivity, which ultimately led to a general ban on uranium mining on the island. This prohibition continues to block the Kvanefjeld project, even though geologically it is among the most promising deposits worldwide.[6]

[3] USGS, National Minerals Information Center as of March 2026
[4] Mining See, Norway's Fen Rare Earth Discovery Could Transform Europe's Strategic Magnet Supply Chain as of 3/5/26
[5] ainvest, Greenland's Critical Minerals Potential: A Strategic Opportunity Amid U.S. Geopolitical Moves as of 1/17/26
[6] GeoQuest, The Kvanefjeld Rare Earth Mining Controversy in Greenland as of March 2026

1.3 Clear distinctions from traditional commodities

Critical minerals are not part of traditional commodity cycles. Commodities such as oil, copper or iron ore have followed a familiar economic logic for decades. Rising demand leads to higher prices, which in turn create investment incentives and, with a lag, additional supply. Though these cycles can be highly volatile, the underlying mechanism remains market-based and relatively transparent. For critical minerals, however, this logic applies only to a limited extent – and this is precisely where the structural break lies.

The term "critical" is less a political designation than an economic one. Critical minerals are raw materials whose importance stems not from their volume or market size, but from their functional irreplaceability. They possess specific physical or chemical properties that are essential for key technologies and can only be substituted to a limited extent, if at all. At the same time, their extraction and processing involve significant technological, regulatory and environmental challenges. This combination – functional importance, low substitutability and high barriers to entry – fundamentally distinguishes critical minerals from traditional commodities.

Rare earths illustrate this logic especially well. Despite their name, they are not geologically rare; many are more widely available in the Earth's crust than copper or lead. They become "critical" due to the nature of these deposits and the complexity of processing them. Rare earths, especially, seldom appear in economically viable concentrations and are chemically similar to one another, making separation costly and labor-intensive. The journey from ore to usable material requires multiple complex steps – from chemical processing to the separation of individual elements and onward to the refinement into metals or intermediate products such as permanent magnets.

This highlights a key differentiating factor from commodities: the depth of the value chain. While much of the economic value for traditional commodities lies in extraction, value creation for critical minerals increasingly occurs in downstream stages – although this does not apply equally to all critical minerals. Refining, separation, metallization, and component manufacturing are technologically demanding, capital-intensive and often associated with significant environmental impacts. These processes cannot be quickly scaled or easily shifted to new regions. The result is structurally low supply elasticity, even in the face of rising demand.

1.4 Why do prices and time horizons play such an important role?

Another major difference concerns the role of prices as a steering mechanism. In many commodity markets, prices function as reliable indicators of scarcity and investment needs. In critical mineral markets, this mechanism only works to a limited extent. Markets are often small, fragmented and opaque. Uranium is a good example of this as most transactions are long-term offtake agreements. Furthermore, political interventions play a significantly larger role than in traditional commodity markets. Export quotas, licensing regimes, state subsidies or strategic price policies can distort or completely override market signals. Low prices therefore do not necessarily reflect oversupply; they may be the result of political direction or deliberately accepted margins.

In addition, new supply takes a very long time to develop. New projects in critical minerals often require ten to fifteen years from exploration to commercial production. In the U.S. the average time from discovery to production even approaches 30 years. Obtaining permits, environmental regulation, developing the appropriate technology and financing act as further brakes. Additionally, in many cases other factors come into play, such as jurisdictional instability (e.g. Argentina), a changing mining codes (e.g. West Africa) or litigation (the U.S., Australia). Demand, on the other hand, is increasing rapidly in response to political targets, such as climate policy, industrial policy or national-security priorities. Resource nationalism is another concern. The mismatch between rapidly rising demand and slow supply response is a defining feature of the structural imbalances within these markets.

Against this backdrop it becomes increasingly clear that critical minerals should not be viewed as commodities for which there is increased short-term demand but as a paradigm shift in which functional scarcity, technological dependency and political intervention play a more prominent role than in commodity markets. In this environment, considerations of efficiency increasingly give way to questions of resilience, supply security and strategic control. This new operating logic forms the foundation for understanding the current demand dynamics and geopolitical implications and ultimately the investment opportunities associated with critical minerals.

2 / A multidimensional demand shock

The currently elevated demand for critical minerals is, in our assessment, not an isolated market phenomenon but the result of a multidimensional demand shock. Unlike in classical commodity cycles, demand is not driven by a single sector or a specific phase of the economic cycle, but by several structural trends that operate in parallel and largely independently of one another. This overlap is new – and it likely explains why tensions in the critical-minerals segment have intensified so markedly within a short period of time.

A central driver is the energy transition. The transformation of energy systems toward electrification and renewable power requires large quantities of specialized metals. Electric motors, wind turbines and the massive expansion of electricity grids all require certain critical minerals. Permanent magnets based on rare earth elements play a particularly important role, as they determine the efficiency, power density and reliability of modern drive systems. This demand is politically anchored and long-term in nature, largely independent of short-term fluctuations in individual end markets.

Essential material requirements for clean energy technology

		Copper	Cobalt	Nickel	Lithium	REEs	Chromium	Zinc	PGMs	Aluminium	Uranium
Electricity Generation	Solar PV	high	low	low	low	low	low	low	low	high	low
	Wind	high	low	moderate	low	high	moderate	high	low	moderate	low
	Hydro	moderate	low	low	low	low	moderate	moderate	low	moderate	low
	CSP	moderate	low	moderate	low	low	high	moderate	low	high	low
	Bioenergy	high	low	low	low	low	low	moderate	low	moderate	low
	Geothermal	low	low	high	low	low	high	low	low	low	low
	Nuclear	moderate	low	moderate	low	low	moderate	low	low	low	high
	Hydrogen	low	low	high	low	moderate	low	low	high	moderate	low
Electricity Networks		high	low	low	low	low	low	low	low	high	low
EVs & battery storage		high	high	high	high	high	low	low	low	high	low

Coloring indicates the relative importance of minerals for a particular clean energy technology (● = high; ● = moderate; ○ = low).
CSP = concentrating solar power; PGM = platinum group metals; EV = electric vehicles; REEs = rare earth elements
Sources: International Energy Agency Report May 2021, DWS Investment GmbH as of April 2026

In parallel, the rapid expansion of digital infrastructure acts as a second, often underestimated, source of demand. Artificial intelligence, cloud computing and hyperscale data centers not only increase electricity consumption but also the need for grid infrastructure, power electronics and highly specialized components. Critical minerals are used here as well – often indirectly, but in growing quantities. As a result, an additional demand source emerges that correlates only marginally with the energy transition but overlaps with it in terms of material requirements.

A third driver has gained significant importance in recent years: defense and security. Modern weapons systems, aerospace technologies and military communication and sensor systems rely heavily on high-performance magnets and other components based on rare earth elements and other critical minerals. In this area, demand is driven less by price and more by function, as technological performance and reliability must take precedence. Rising defense spending across many industrialized countries reinforces this effect.

The key point is that these three axes of demand – the energy transition, digitalization and security – are largely independent of one another. Even if individual segments temporarily lose momentum, we would expect aggregate demand to remain structurally high. This explains why short-term slowdowns, such as weaker global EV sales, do not change the overall picture. In our view, what we are observing is not a cyclical boom but a structural rise in demand.

Combined with the low supply elasticity described earlier, these demands inevitably produce tensions. The more that multiple strategic sectors draw on the same scarce resources, the greater the political and economic relevance of these materials. As a result, demand dynamics are the foundation for the increasing politicization of supply chains and push the issue to the forefront of geopolitical decision-making.

3 / Critical minerals as an instrument of power

3.1 Shift from commodity markets to geopolitical leverage

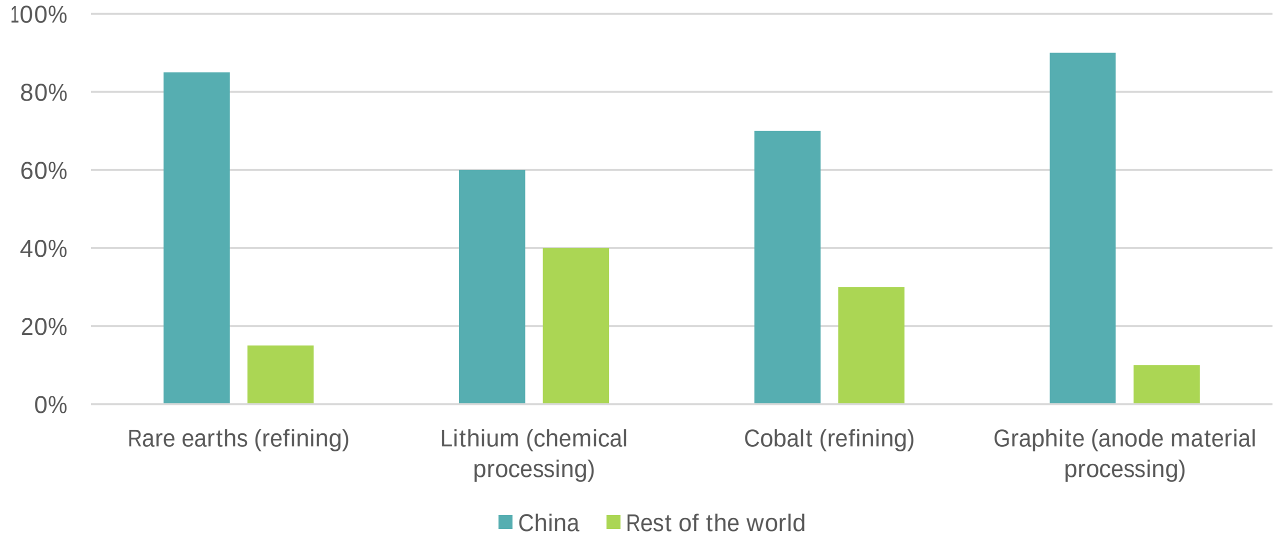
The growing importance of critical minerals is shifting the discussion away from conventional commodity topics towards questions of power and geopolitical order. While raw materials have traditionally been viewed as tradable goods whose availability is determined primarily by prices, production costs and transport routes, critical minerals have now become integral to industrial and security-related capabilities. They affect not only the competitive position of individual companies but are increasingly relevant for questions of strategic autonomy at the national level. In this sense, critical minerals are less part of an ordinary commodity market and more building blocks of a new geopolitical architecture.

A key reason for this development is the structure of value chains. For many traditional commodities, geopolitical leverage historically stemmed from control over mining sites and transport routes. For critical minerals, however, leverage shifts significantly into the downstream stages of the value chain. Refining, separation and processing into technologically sophisticated intermediate products are the real bottlenecks. These processes are capital-intensive, technologically complex, and environmentally sensitive. They require specialized know-how, long-standing experience and regulatory acceptance. As a result, they can neither be scaled up quickly nor relocated to new regions at short notice. Whoever controls these stages controls not only volumes but also quality, usability and the timing of availability.

Over several decades China has built a dominant position in precisely these segments. This dominance is based less on geological monopolies and more on long-term industrial policy aimed at processing capacity, technological learning curves and economies of scale. Today, China controls a large share of global refining and separation capacity for rare earth elements and is virtually without alternative when it comes to heavy rare earths. In addition, China dominates the production of permanent magnets, which are indispensable for a wide range of modern technologies. This position provides not only market power but also strategic steering capability across global supply chains.[7]

[7] FAZ, Chinas langer Marsch an die Weltspitze: Monopol bei seltenen Erden as of 11/9/25

Global concentration of critical minerals processing (share of global refining capacity)



Sources: International Energy Agency (IEA), Global Critical Minerals Outlook 2025, DWS Investment GmbH as of 5/21/25

In recent years it has become increasingly clear that this structural position is being used actively for political purposes. Export controls, licensing systems and technology restrictions should not be understood as short-term trade measures, but rather as part of a broader strategic toolkit. In particular, the introduction of licensing requirements for certain rare earths and magnet-related technologies has demonstrated how flexibly and selectively supply chains can be influenced. Since many products outside China still contain Chinese intermediate goods or technologies, such measures often have extraterritorial effects. Supply chains are becoming increasingly uncertain and politically conditioned.

3.2 Vulnerabilities, policy response and a new market regime

For Europe and the United States this creates a structural vulnerability that goes beyond direct import dependencies. Even where end products are sourced from third countries, indirect dependencies often remain, through intermediate goods, processing stages or technological inputs. Network and supply-chain analyses show that a large share of European industrial companies are only a few intermediary steps removed from Chinese actors within the rare-earth value chain. The consequences range from heightened production risks and price shocks to delays in strategically important sectors such as automotive manufacturing, energy technology and defense.

Industrial and raw-materials policy is therefore returning to the forefront of political action in Western economies. Initiatives such as the European Critical Raw Materials Act or the U.S. "mine-to-magnet" strategy aim to gradually reduce dependencies and build strategic capacity. It is becoming clear, however, that the objective is not full autonomy, but risk reduction and resilience. Building alternative value chains is costly, time-consuming and intensive in terms of regulation. At the same time, governments increasingly accept higher costs when these translate into greater supply security, planning reliability and strategic freedom of action.

Market mechanics are also responding directly to these shifts. Prices are losing part of their signaling function, as political interventions, strategic allocations and government support measures come to the fore. Offtake guarantees, government-backed minimum prices and public equity stakes are reshaping the risk profiles across the value chain. Taken together, a new market regime is emerging in which strategic priorities increasingly override efficiency considerations.

Critical minerals are thus becoming an instrument of economic governance, with direct implications for investment decisions, capital allocation and long-term business models. Where government interests protect structural bottlenecks and partially absorb risks, new politically supported cash-flow profiles may emerge. This helps explain why, particularly in processing and value-added stages, certain segments of the value chain are not only geopolitically sensitive but also economically attractive.

4 / From bottleneck to profit opportunity

4.1 Where profits accrue: mining vs processing

A mine is often the first step toward today's technologies of the future. Yet, unlike with many traditional commodities, the economic success of a project today depends less on the quality of a deposit alone than in the past Developing new mines for critical minerals involves a complex interplay of geology, technology, regulation, and political support. For investors, the relevant question is therefore not only "is the resource there?" but also whether a project can be permitted, financed and integrated into a viable downstream pathway.

Mining companies now operate in an environment that is fundamentally different from the past. High-quality deposits remain an important foundation but are no longer sufficient on their own. Projects today are shaped by factors that lie outside the traditional commodity market: years-long permitting procedures, environmental requirements, access to energy and water, and increasingly the question of whether governments and industry are willing to support a project through long-term offtake agreements or investment incentives. Where such arrangements exist, they can reduce financing risk and smooth cash-flow volatility versus purely spot-exposed projects. This helps to explain why investment can continue even during periods of temporary price declines: sponsors may be underwriting a contracted pathway, not simply a commodity cycle.

This applies even more strongly to the processing steps between extracted minerals and usable end materials. Here, success is not determined by the quantity of resources but by the ability to achieve high-purity metal separation, master complex chemical processes or produce sophisticated intermediate products such as battery chemicals or magnet materials. These processes are difficult to replicate, require specialized facilities and years of technical experience and are globally concentrated. Companies that possess this expertise therefore can occupy leadership positions that depend far less on short-term price movements and resemble industrial bottlenecks more than a traditional commodity business.

At the same time, more and more governments recognize how essential these technologies are for their economic and security-related capabilities. As a result, support programmes have expanded significantly: investment grants, tax incentives, low-cost financing, and accelerated permitting procedures are being deployed to build new capacity and reduce dependencies. In the U.S. frameworks such as the FAST-41 process aim to streamline and coordinate federal permitting for critical mineral projects, improving visibility, shortening timelines and reducing execution risk. In some cases, the public sector is also taking direct stakes in development-stage projects. For investors, these interventions can change the risk allocation across the value chain–potentially improving project bankability, while increasing exposure to policy and implementation risk.

Opportunities are also emerging in downstream segments, although these are far more selective. In industries such as aerospace, power electronics or high-precision sensor systems, reliability is paramount. Material requirements are high, and the number of qualified suppliers is limited. Companies that meet these standards seldom face aggressive price competition; instead, they can benefit from long-term customer relationships and stable demand. They do not merely deliver raw materials, but provide an essential contribution to the functionality of entire technologies.

4.2 What makes business models resilient

For investors, the sector is becoming increasingly complex because assessing such companies requires more than analyzing the current metal price and supply and demand. It is about understanding how robust a project is. How secure are the permits? How likely is government support to facilitate development? How mature is the technology? Are there reliable industrial partners or long-term supply agreements? And how well does the company meet environmental and social standards, which are now often prerequisites for access to global markets?

Answering these and similar questions helps identify business models that may continue to operate even when markets become more volatile. Even if prices fluctuate temporarily, structural demand for these critical minerals is expected to remain high. The energy transition, the expansion of digital infrastructure and security-relevant applications cannot simply be "paused." For many companies, this creates a demand base that extends across cycles.

Risks include delays in large-scale projects and, above all, geopolitical tensions. These factors can raise costs, extend timelines, and disrupt supply. At the same time, they can also reinforce the strategic value of scarce processing capabilities and diversified supply pathways. Taylor Smith, Co-Head of Commodities & Natural Resources Equities at DWS, notes: "From an investor perspective, a key differentiator is whether a company can operate through volatility—through process know-how, contracted demand, access to financing and an ability to meet permitting and other requirements."

In other words, the question is not 'where do spot prices go next?' but which parts of the economy are being reshaped—for example: the reconfiguration of energy systems, the build-out of digital infrastructure, and the growing willingness of governments to treat certain inputs as strategic. The investable opportunity set, however, is heterogeneous. Smith adds: "Returns can be driven by execution (permitting, capex, ramp-up), policy design and where along the chain scarcity becomes binding. As a result, a company-by-company assessment of positioning and risk is more informative than broad "critical minerals" exposure."

5 / Summary and outlook: A structural investment theme

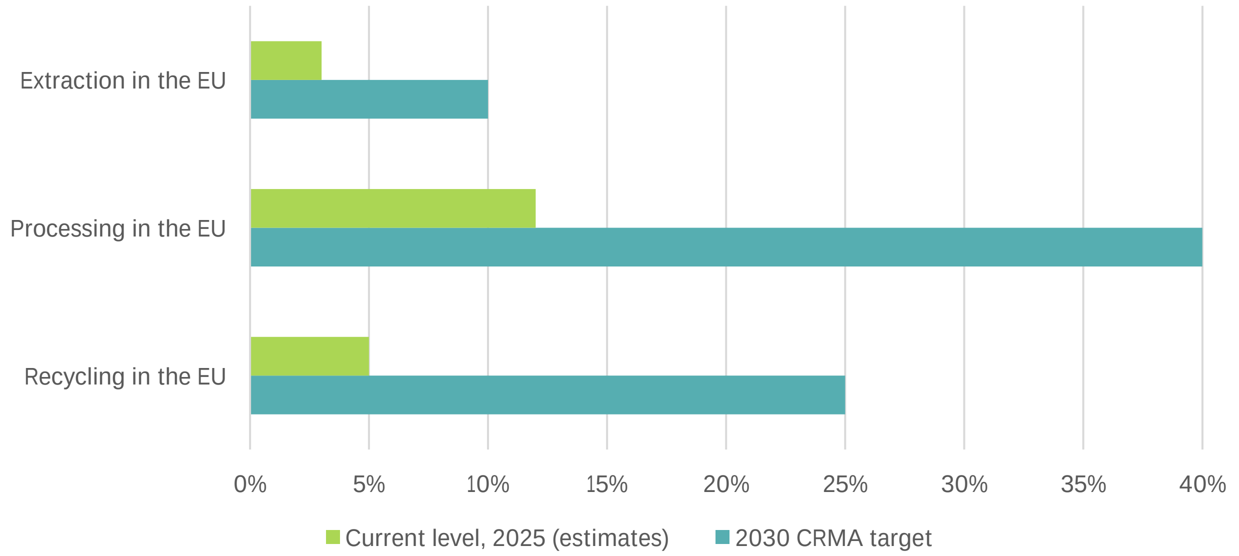
In the preceding chapters we have argued that critical minerals are not merely another trend in a rapidly evolving commodity market but a structural theme that may shape the industrial, geopolitical, and economic landscape over the coming decades The combination of functional irreplaceability, technological barriers to entry, inelastic supply, and the overlap of several strategic demand drivers has created a market environment that differs meaningfully from many traditional commodity markets. Critical minerals increasingly sit at the intersection of political objectives and industrial capabilities, implying that policy decisions can have a larger influence on market outcomes than in more transparent, liquid commodity segments.

This has given rise to a new regime in which classical efficiency considerations are increasingly supplemented by aspects of resilience and security. Governments are willing to accept higher costs, longer permitting processes, and more direct political intervention in order to strengthen supply security and strategic autonomy. Europe demonstrates this particularly clearly through the Critical Raw Materials Act (CRMA), which defines specific targets for 2030. According to the CRMA, 10% of critical-mineral demand is to be extracted within the EU, 40% processed, and 25% recycled.[8] However, the EU as a whole—and Germany in particular—remains far from achieving these targets. While Norway, Spain and Sweden are advancing with initial projects, Germany lacks both significant raw-material deposits and adequate processing and recycling capacities. This highlights the considerable gap between ambition and reality, especially in strategic intermediate products such as

[8] Bundesministerium für Wirtschaft und Energie, Europäische Industriepolitik - Der europäische Critical Raw Materials Act (CRMA) as of 3/10/25

permanent magnets or rare-earth refining, which were outsourced for decades. Rebuilding such capacities is costly, politically demanding and time-intensive. Nevertheless, it is increasingly regarded as necessary for economic stability.

Europe: Ambition vs. reality - CRMA 2030 targets compared with the estimated current status



Sources: European Commission (CRMA), International Energy Agency, US Geological Survey, own estimates, DWS Investment GmbH as of April 2026

At the same time, the supply side of critical minerals is becoming more political and less price-elastic. Export controls, licensing systems, technology bans and extraterritorial regimes reflect a world in which supply chains have growing political as well as economic importance. This can generate higher volatility, as market signals are distorted, supply forecasts become politicized and offtake flows can be redirected. For companies and investors this can create an environment in which prices carry less informational value, while political decisions increasingly shape risk-and-return profiles.

For capital markets, this results in a dual challenge. Classical commodity thinking, heavily focused on cyclical price swings, may be less informative in markets that are smaller, more opaque, and increasingly policy-driven. The more relevant questions are where scarcity becomes binding (mining vs. refining vs. components), how quickly alternative capacity can be built, and how policy tools (export controls, subsidies, strategic stockpiles, offtake support) alter incentives. This argues for a more granular, value-chain approach rather than broad commodity beta.

From here, a practical investor takeaway is that "critical minerals exposure" is not a single trade. It depends on the segment (upstream vs. downstream), the jurisdiction, the availability of long-term contracts, and the degree of policy involvement. In our view, monitoring a small set of indicators can help frame the opportunity and the risks: (i) changes in export controls and licensing regimes, (ii) progress in permitting and commissioning of non-China processing capacity, (iii) evidence of binding shortages in magnets/battery materials rather than ores, and (iv) the terms and counterparties behind new offtake agreements. Volatility is likely to remain a feature of these markets; the challenge is to distinguish noise in spot prices from changes in underlying supply security.

Critical minerals are likely to remain a central structural theme for the foreseeable future. Global demand should continue to rise as geopolitical tensions are shaping their strategic importance as well as their value chains, and the supply side will likely adjust only slowly despite political intervention. For investors, we think this creates a long-term, attractive yet complex environment – one shaped less by short-term trends than by lasting shifts in power. In a world where raw materials have once again become part of strategic infrastructure, the ability to understand and interpret these dynamics has itself become a competitive advantage.

Glossary

Cloud computing encompasses technologies and services that offer the dynamic and flexible use of a third party's IT infrastructure.

The European Union (EU) is a political and economic union of 27 member states located primarily in Europe.

NATO is a Western military alliance with currently 30 member states

A (Commodity) supercycle is an extended period of (commodity) price increases that goes beyond normal cyclical fluctuations, driven by lasting structural changes in demand and/or supply, rather than short-term economic momentum.

Volatility is the degree of variation of a trading-price series over time. It can be used as a measure of an asset's risk.

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