# Bridging the Raw Materials Gap in EU Strategic Autonomy

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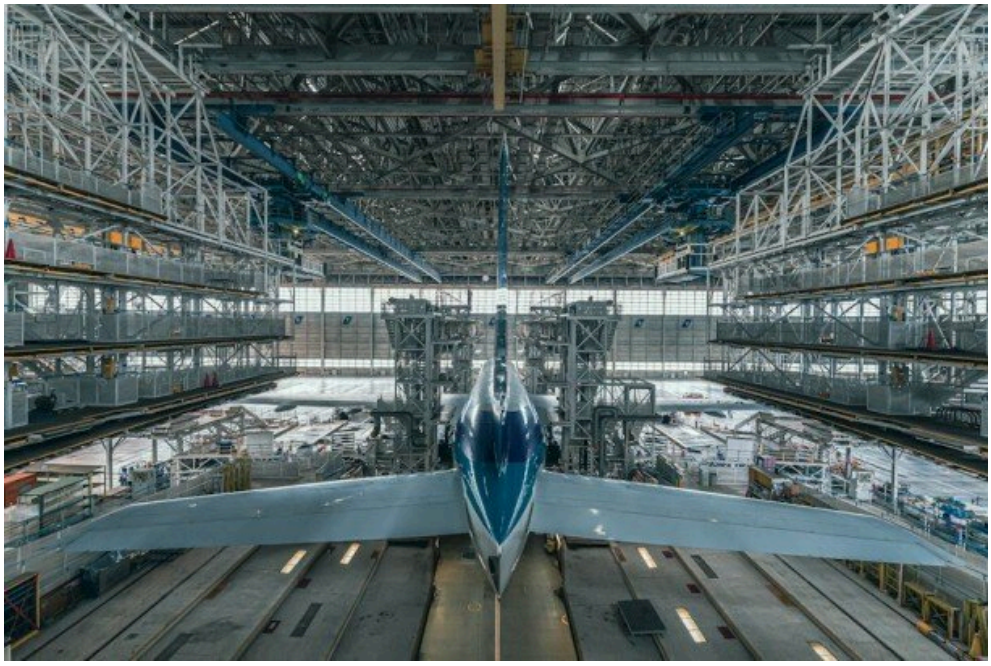

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The White Paper for European Defence – Readiness 2030 sets the goal of closing capability gaps in key military domains, including air and missile defence, aiming for "an integrated, multi-layered air and missile defence that protects against a full spectrum of air threats" (European Commission, 2025, p. 7). Additionally, the European Union (EU) is working towards a 'defence union', implying a significant scaling-up of the European Defence Technological and Industrial Base (EDTIB) and its equipment production. However, this expansion requires a resilient and autonomous EDTIB, in which equipment can genuinely be labelled as 'Made in Europe'. At the same time, this labelling depends on the autonomy of the supply chain that supplies Critical Raw Materials (CRMs). CRMs are integral for a growing range of defence applications, spanning sensors, electronics and propulsion systems. As military technologies become increasingly sophisticated, demand for these materials is likely to rise accordingly, putting the resilience of supply chains under strain. Currently, CRM markets are dominated by third countries, which leverage this dominance to

advance their own geopolitical interests. Over the past two decades, China has established a monopoly over global CRM supply chains. The 2025 US-China tariff war, during which Beijing imposed export restrictions on seven rare earth elements and related magnets bound for the European Union (Szczepanski, 2025), demonstrated its readiness to restrict CRM access whenever its strategic interests require it. This weaponisation of supply chains leaves the realisation of the EDTIB's ambitions vulnerable to geopolitical shifts. According to the Hague Centre for Strategic Studies (HCSS), among the main military domains, the aerospace domain is particularly vulnerable to supply chain disruptions (Girardi et al., 2023). The raw materials critical to aircraft, helicopters and missiles are more likely to carry high supply-risk ratings and lack viable substitutes than those needed for other platforms, such as naval vessels. This article aims to assess the options available to the European aerospace and defence sector in the face of potential disruption to the CRM supply chain. Therefore, it asks: What can the EU do to strengthen the resilience of the supply chains that underpin the European aerospace-defence sector amid geopolitical uncertainty?

**Third Country-Supplied CRMs in the Aerospace Industry**

A comprehensive report by The Hague Centre for Strategic Studies (HCSS) identifies aluminium, graphite, and titanium as among the most widely used materials in the defence aerospace sector (Girardi et al., 2023), all three of which are considered critical raw materials by the EU (Regulation-EU 2024/1252). These materials are used throughout the airframe, including the fuselage, wings, tail, and nose, and in propulsion components such as combustors, nozzles, drive shafts, and propellers, as well as landing gear, connectors, and electronic systems. Titanium is additionally used in avionics, sensors, and electro-optical systems (Girardi et al., 2023).

China unquestionably leads the global graphite market, accounting for 67% of world production and standing as the EU's main supplier (European Commission, 2026). Titanium, on the other hand, is concentrated in a handful of geographical areas, namely Russia, Kazakhstan, and China, which together account for the bulk of global titanium sponge output (Desai, 2022). Although imports have declined, the EU has not yet imposed an import ban on Russian titanium producer VSMPO-AVISMA at the time of writing. European production of combat and airborne surveillance aircraft, therefore, remains dependent on partnerships with third countries and, consequently, vulnerable to geopolitical shifts.

For instance, the Swedish defence manufacturer Saab was selected in July 2026 by 11 NATO Allies to provide a fleet of GlobalEye aircraft for the Alliance's next-generation Airborne Early Warning & Control systems (AEW&C) (NATO, 2026). GlobalEye differentiates itself through long-range, multi-domain (air, land, and sea) real-time surveillance (Saab, 2026), enabled in part by the innovative use of gallium nitride in coating the Erieye

radar (Saab, 2024). EU import reliance on gallium stands at 98%, while China accounted for 94% of global production between 2016 and 2020 (Hackett et al., 2025). China supplied 77% of EU gallium imports in 2025, followed by Canada and the United States at 11% and 3%, respectively (Eurostat, 2026). In April 2025, China added scandium, a critical additive to the aluminium alloys used in airframe manufacturing, to its list of export-controlled materials, alongside gallium, germanium, and graphite, which had already been restricted since 2023 (Szczepanski, 2025).

The EU's ambition to source at least 50% of Member States' defence procurement from the EDTIB by 2030, rising to 60% by 2035 (European Commission, 2024), depends on resilient industrial supply chains. Continued dependence on third-country raw material exports, particularly from China, poses a significant constraint on the EU's efforts to strengthen its defence-industrial autonomy.

**Chinese Monopoly over CRM Global Supply Chains**

Sophia Kalantzakos (2019), Global Distinguished Professor in Environmental Studies and Public Policy at New York University and NYU Abu Dhabi, explains that China's monopoly over global CRM supply chains is due in part to the "verticality" of Chinese mining companies (Kalantzakos, 2019, p. 7). Essentially, it means that Chinese companies have established a dominant presence from extraction to downstream manufacturing. China Northern Rare Earth Group offers a clear illustration: it is the world's largest rare earth producer and operates the Bayan Obo mine in Inner Mongolia, which alone accounts for roughly 83% of China's rare earth reserves (Rare Earth Exchanges, 2026). It has expanded from mining and separation into permanent magnet manufacturing and other downstream applications, securing a presence across the chain. Similarly, China's biggest lithium producer, Jiangxi Ganfeng Lithium, is also vertically integrated (Ganfeng Lithium, 2026). The EU should therefore take this vertical integration into account when designing policies to reduce its dependence on third-country CRM exports, rather than addressing isolated segments of the value chain.

Building on this view, Gracelin Baskaran of the CSIS Critical Minerals Security Program attributes China's success to a combination of foreign policy tools, such as the Belt and Road Initiative, and aggressive domestic policies that built refining capacity. Pointing to the Chinese case, she argues that the United States should adopt the same combination of external engagement and domestic industrial policy (Baskaran, 2026).

Following China's 2023 export licensing controls, European gallium spot prices rose over 40% (Amoah et al., 2026). After Beijing tightened these measures into a near-total embargo on Western markets in late 2024, prices reached $687/kg by May 2025 – over 150% above pre-control levels (Powers-Riggs et al., 2025). SEMI Europe, representing over 300 European semiconductor companies, warns that further restrictions would expose

the continent's defence electronics sector, given the absence of domestic gallium production capacity (SEMI Europe, 2024).

### Aerospace Defence Industry's Options in the Face of Potential Supply Chain Disruptions

Supply chain management in the defence sector requires close public-private collaboration, given the high stakes for both sectors (Le Mouel & Poitiers, 2023). At the European level, efforts intensified in 2020 as Brussels sought to mitigate risks associated with CRM supply chain disruptions. The 2020 European Action Plan on Critical Raw Materials was the first strategic document aimed at building EU resilience and open strategic autonomy in this area (European Commission, 2020). The 2024 Critical Raw Materials Act (CRMA) set 2030 benchmarks: at least 10% of extraction should originate domestically, domestic processing capacity should reach at least 40%, recycling should reach 25%, and no more than 65% of any strategic raw material's supply, at any stage of processing, may come from a single third country (Regulation-EU 2024/1252). The 2025 ReSourceEU package established institutional bodies and mechanisms, including the new European Critical Raw Materials Centre, to fast-track implementation of the CRMA (European Commission, 2025).

Of the tools available to the EU to secure its supply of critical raw materials – stockpiling, strategic partnerships, diversification, and domestic extraction and processing – diversification of suppliers is perhaps the strongest. Since 2021, the EU has concluded 16 strategic partnerships on raw materials with resource-rich countries, including the Democratic Republic of the Congo, the USA, South Africa, Uzbekistan, Greenland, Chile, Argentina, Rwanda, Zambia, Norway, Australia, Canada, Kazakhstan, Namibia, Serbia, and Ukraine (European Commission, 2026). Even so, the CRMA does not fully address the external dimension of EU dependency: its targets and instruments are overwhelmingly inward-looking. As Le Mouel and Poitiers (2023) argue, a strategy centred on domestic capacity cannot, on its own, resolve the EU's exposure, since even the full achievement of the 2030 targets would leave the majority of extraction and processing outside Europe. This matters because CRM-producing countries are diversifying their customer base and moving up the value chain. The EU is therefore not simply choosing suppliers from a static pool; it is competing with China, the US, and other blocs for the same partners, on terms increasingly set by those partners rather than by Brussels. Whether EU raw-materials diplomacy moves beyond largely non-binding memoranda toward partnerships backed by offtake agreements and co-investment will likely determine how much genuine diversification of supply security can deliver. An offtake agreement is a long-term commitment to purchase a producer's critical raw materials, helping producers secure financing while providing buyers with supply certainty (Leary & Marsh, 2024).

European primes are also pursuing their own supply strategies. Following Russia's full-scale invasion of Ukraine, when the reliability of Russian titanium was thrown into doubt, Airbus and Safran, together with the investment firm Tikehau Ace Capital, acquired Aubert & Duval, a key French processor of titanium and other aerospace alloys, to secure a domestic source of supply (Kaminski-Morrow, 2022). More recently, Leonardo announced a recycling initiative aligned with the CRMA's circularity goals, aiming to catalyse the development of a circular CRM supply chain in Europe (Leonardo, 2025).

Company-level action alone, however, is unlikely to be sufficient. Three market failures are particularly relevant: moral hazard, competitive pressure, and collective-action problems (Barata de Rocha et al., 2026 – Bruegel). Moral hazard arises when firms underinvest in supply-chain diversification because they expect government intervention in the event of a shortage. In the CRM context, this has translated into a reluctance to pay extra for non-Chinese suppliers. During the 2010 rare-earth crisis, several firms either relocated production to China or temporarily diversified their supplier base, reverting to Chinese sourcing once Beijing eased restrictions and prices fell (Kalantzakos, 2019). Competitive pressure compounds the problem: sourcing from costlier non-Chinese suppliers is a disadvantage for European manufacturers in sectors such as aerospace, where CRMs account for a significant share of final product costs. Finally, collective-action problems arise because most individual firms purchase only small quantities of specialised materials. A firm may therefore lack sufficient demand to justify new mining or processing capacity. EU coordination, through demand aggregation or direct support, can help overcome this constraint.

Stockpiling is another option; Japan offers a model: it has operated a national rare-metal stockpiling system since 1983 (JOGMEC, 2026). But stockpiling has its own limits. First, it is difficult to predict which materials will prove critical several years from now; a European Parliament study similarly notes that the optimal composition and quantity of a stockpile are uncertain and must account for political, economic, and technological developments (Rietveld et al., 2022). Second, some critical materials are not suited to long-term storage. Pure gallium, for example, has a shelf life of about one year, suggesting that stockpiles would require regular maintenance and replenishment (Funaiole et al., 2023).

Lastly, domestic production is not a quick fix: bringing a new mine from exploration to production typically takes 10 to 15 years in the EU, given permitting and environmental-review requirements (Righetti & Rizos, 2023). This timeline is also likely to revive the environmental concerns that contributed to the closure of many European mines.

## Conclusion

Europe's 2030 defence-industrial ambitions rest on critical raw materials that it does not control. The aerospace sector is especially exposed: titanium, graphite, gallium, and scandium are concentrated in a handful of third countries, chiefly China, whose vertical integration and willingness to weaponise exports have already been demonstrated. No single tool, diversification, stockpiling, domestic extraction, or company-level action is sufficient to close this gap alone, as each has limitations. A 'Made in Europe' label attesting to the sovereignty of the EDTIB depends on the EU's ability to secure reliable and resilient CRM supply chains.

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