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Towards a More Secure Country? The Role of Critical Raw Materials in Spain and Europe

Introduction

In an international environment characterised by growing instability, the concept of security is gaining prominence on global, European and national political agendas. The current geopolitical landscape is complex and volatile, with active conflicts across several continents, the continuation of the war in Ukraine, and Russia's persistent military and geo-economic threat in Europe. As a result of technological developments and the changing nature of conflict, Europe and Spain are facing an increasingly complex geostrategic reality, marked by the growth of hybrid threats.

However, European and Spanish security is not limited to the military dimension of defence against these threats. The concept of security also encompasses industry and energy, both of which are fundamental to strategic autonomy. These three pillars of security — defence, industry and energy — share key characteristics: their importance for national and European security, their dependence on critical raw materials (CRMs), and their vulnerability to potential disruptions in global supply chains.

In this context, CRMs are acquiring a central role in national security, supported by recent developments in policy and strategic frameworks that reflect a growing recognition of their value for NATO, the European Union and Spain.

NATO's approach

NATO's recent actions reflect a clear acceleration in the recognition of CRMs as essential elements for the military alliance. In June 2024, NATO published a roadmap to strengthen the security of defence-critical supply chains.¹ This was followed by a list of 12 strategic materials for defence technologies,² aligned with those of the EU and other countries, and by the update of its Defence Production Action Plan in early 2025,³ which incorporates specific measures to strengthen the resilience of these supply chains. The

¹ - NATO, "Defence-Critical Supply Chain Security Roadmap", 2024, <https://www.nato.int/content/dam/nato/webready/documents/factsheets/240712-Factsheet-Defence-Supply-Chain-Roadmap-en.pdf>.

² - NATO, "NATO releases list of 12 defence-critical raw materials", 2024, <https://www.nato.int/en/news-and-events/articles/news/2024/12/11/nato-releases-list-of-12-defence-critical-raw-materials>.

³ - NATO, "Updated Defence Production Action Plan", 2025, <https://www.nato.int/en/about-us/official-texts-and-resources/official-texts/2025/02/13/updated-defence-production-action-plan>.

plan addresses vulnerabilities and bottlenecks, and includes the possibility of stockpiling, onshoring and friendshoring strategies.

EU's approach

In a context of growing geoeconomic rivalry between the European Union, the United States and China, the perspective of the European Commission and the Member States changed significantly over the period 2024–2026. This period coincided with the end of the first von der Leyen Commission, the European Parliament elections, and the formation of the new European Commission — still chaired by von der Leyen, but supported by a more right-leaning political majority led by the main bloc of the European People's Party. It was in this political context that Mario Draghi's report on the competitiveness of the Union was presented.⁴ The report stresses the need to develop an industrial policy capable of providing regulatory and financial support to strategic sectors, including the extraction and refining of CRMs.

The new Commission incorporated the recommendations of the Draghi report into its 2025–2029 priorities through the document known as the “Competitiveness Compass”. In the months that followed, the Clean Industrial Deal (2025)⁵ was published, incorporating elements of the pre-existing Critical Raw Materials Act (2023). The objective of the EU's emerging industrial policy is to limit external dependencies on the critical raw materials needed to advance other European priorities: strategic autonomy, including the strengthening of military capabilities; reindustrialisation for a more competitive economy; and the energy transition as a lever for decarbonisation.

These efforts are complemented by other relevant instruments. In March 2025, the first IPCEIs — Important Projects of Common European Interest — related to CRMs were published, with significant Spanish participation, prioritising funding and accelerating permitting for CRM extraction, refining and recycling projects. In March 2026, the legislative proposal for the Industrial Acceleration Act⁶ was presented, using public

⁴ - DRAGHI, Mario, “The future of European competitiveness. Part A. A Competitiveness Strategy for Europe”, 2024, https://commission.europa.eu/topics/competitiveness/draghi-report_en.

⁵ - European Commission, “Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. The Clean Industrial Deal: A joint roadmap for competitiveness and decarbonisation”, 2025, https://commission.europa.eu/topics/competitiveness/clean-industrial-deal_en.

⁶ - European Commission, “Preguntas y respuestas sobre la Ley de Aceleración Industrial”, 2026,

procurement and incentives to stimulate demand for low-carbon and European-made products, accelerate investment in net-zero technologies, and introduce specific conditions to ensure that major foreign direct investments generate added value for the EU.

Spain's approach

Spain⁷ follows the strategic approaches set out by NATO and the EU, acting in line with the actions described in this section and implementing national policies and investment projects aligned with Europe's objectives of competitiveness, strategic autonomy and reindustrialisation.

Among other measures, Spain has published a Roadmap for the Sustainable Management of Critical Raw Materials.⁸ This includes 46 regulatory, sectoral, R&D&I-related and cross-cutting measures to support the raw materials industry in creating sustainable and efficient value chains that contribute to sustainable and competitive European industrial development.

Furthermore, the National Energy and Climate Plan (PNIEC)⁹, updated in 2024, addresses CRMs in the context of the energy transition, focusing on security of supply, the reduction of dependencies and the promotion of circularity.

"In light of the context described above, this update further develops the commitment to strategic autonomy, both through a significant strengthening of efforts to reduce external energy dependence and through specific measures linked to manufacturing and the technologies of the value chain associated with the transition, as well as the strategic raw materials required for it" (p. 14 PNIEC).

https://ec.europa.eu/commission/presscorner/detail/es/qanda_26_516.

⁷ - Oficina C, "Materiales y materias primas críticas en la transición energética", 2024, <https://oficinac.es/es/informes-c/materiales-y-materias-primas-criticas-en-la-transicion-energetica>.

⁸ - MITECO, "Hoja de Ruta para la gestión sostenible de las materias primas minerales", 2026, <https://www.miteco.gob.es/es/ministerio/planes-estrategias/materias-primas-minerales.html>

⁹ - MITECO, "Plan Nacional Integrado de Energía y Clima (PNIEC 2023-2030)", 2023, <https://www.miteco.gob.es/es/energia/estrategia-normativa/pniec-23-30.html>.

In this context, the new Industrial and Technology Plan for Security and Defence 2025¹⁰ reflects a clear ambition for Spain's role in national, European and NATO security, promoting strategic sovereignty, the development of the defence industry and technology, and the strengthening of Spain's position as a key actor within NATO and the EU.¹¹

From strategy to action

Despite the acceleration of policies and initiatives, a structural limitation persists that places NATO, the EU and Spain at a disadvantage compared with other global actors. The contrast with China is clear: while Europe is gradually adopting a more proactive and long-term policy approach, China plans strategically over horizons spanning centuries and has been investing in CRMs since the 1980s. Its governance model allows for a greater capacity to mobilise public resources, which is one of the factors that partly explains its dominant position in CRM value chains.

Although it may be argued that the EU and Spain operate under very different premises, policy efforts should not fall into the trap of focusing on criticism of the Chinese model. Instead, the strategic role of CRMs for national security must be recognised, together with the reality that Europe is moving late in relation to an actor operating with greater speed and strategic coherence. This requires a shift towards a more proactive policy, with more ambitious measures and long-term planning capable of anticipating the challenges of the coming decades, addressing growing hybrid threats, promoting industrial competitiveness and ensuring a secure energy supply.

The three pillars of national security

In this section, the analysis is structured around the three identified pillars of national security: defence, industry and energy. These sectors share the need to reduce vulnerabilities arising from their dependence on critical raw materials, whose supply chains are highly concentrated.

Defence

¹⁰ - Gobierno de España, "Plan Industrial y Tecnológico para la Seguridad y la Defensa", 2025, [230425-plan-industrial-y-tecnologico-para-la-seguridad-y-la-defensa.pdf](#).

¹¹ - Europa Press, "La industria española de defensa apuesta por la autonomía estratégica y la colaboración público-privada", 2025, <https://www.europapress.es/economia/noticia-industria-espanola-defensa-apuesta-autonomia-estrategica-colaboracion-publico-privada-20250630125340.html>

Defence constitutes one of the three fundamental pillars of national security, not only in its traditional military dimension, but also as a core capability of states in an increasingly complex geopolitical landscape. In recent decades, the nature of conflict has evolved significantly, with the proliferation of hybrid threats and grey-zone operations. These actions, carried out by both state and non-state actors, combine military, technological and economic means, and represent risks that go beyond military objectives, affecting critical functions of society, the economy and national infrastructure.

At the European level, the most obvious threat to stability and peace on the continent remains an expansionist and aggressive Russia, driven in part by its fear of NATO enlargement along its western border. Although the war in Ukraine remains the epicentre, Russia has carried out fighter jet incursions into Estonian airspace¹² and has been suspected of drone incursions into NATO member states such as Poland, Norway and Denmark. In addition, at least eleven undersea cables and pipelines in the Baltic Sea were sabotaged between October 2023 and January 2025.¹³ These trends point to a rise in hybrid threats and grey-zone operations to which Spain is also exposed, potentially designed to test NATO's limits on the European continent without crossing the threshold of conventional war.

Spain's membership of both NATO and the EU makes it a relevant target for hybrid threats. The 2024 Annual National Security Report identifies attacks on critical infrastructure as one of the main threats.¹⁴ According to Europa Press, COSCO Shipping Ports acquired 51% of Noatum Ports and took control of the terminal at the Port of Valencia in 2017, and has since also acquired partial control of the Port of Bilbao.¹⁵ The presence of the Spanish subsidiary of China COSCO Shipping Ports Limited in Spain's critical infrastructure, operating under the control of the Chinese state and identified by the US Department of Defense as a "Chinese military company"¹⁶, contributes to

¹² - LUKIV, Jaroslav y INWOOD, Joe, "Estonia seeks Nato consultation after Russian jets violate airspace", 2025, <https://www.bbc.com/news/articles/czrp6p5mj3zo>.

¹³ - CHOWDHURY, Shahim, "At Least 11 Baltic Cables Sabotaged in 15 Months: What to Know", 2025, Newsweek, <https://www.newsweek.com/least-11-baltic-cables-sabotaged-15-months-what-know-2021972>

¹⁴ - Gobierno de España, Ministerio de la Presidencia, Justicia y Relaciones con las Cortes, "Informe Anual de Seguridad Nacional 2024", 2025, <https://www.dsn.gob.es/en/node/25659>.

¹⁵ - Europa Press, "La china Cosco compra el 51% de Noatum Ports por 203,5 millones tras la reforma de la estiba", 2017, <https://www.europapress.es/economia/noticia-china-cosco-compra-51-noatum-ports-2035-millones-reforma-estiba-20170612163315.html>.

¹⁶ - GUBIN, A., "La estatal china COSCO teje su red de control en España: puertos estratégicos, nodos logísticos y

increasing the vulnerability of Spain's critical infrastructure. Closely connected to this vulnerability, the annual report highlights the growing vulnerability of Spanish cyberspace. In 2024, cyberattacks against Spain's essential infrastructure increased, with growing activity from China, Iran and North Korea, particularly affecting the energy sector.¹⁷

In this context, having a credible defence capability is essential for national security. Spain maintains a significant deployment in EU and NATO missions across Europe, Africa, the Sahel, the Middle East and the Indo-Pacific.¹⁸ It is militarily present across air, maritime and land domains in key regions: from its participation in a battle group in the Indo-Pacific alongside Australia and Japan, in a context marked by Chinese pressure on Taiwan, to the political recognition of Palestine in the Middle East and operations in Mozambique. These missions strengthen deterrence, contribute to regional stability and protect Spain's strategic interests in a volatile global environment. Although these missions are not directly aimed at securing access to CRMs, many of them have an indirect dimension linked to these resources, as they contribute to the stability of key regions for their production. This is the case of Ukraine, with potential in materials such as lithium, titanium and rare earths; Mali, which is rich in lithium; and the Indo-Pacific region, where stability around Taiwan is critical for global value chains, particularly in sectors such as semiconductors. At the same time, growing pressure within NATO to increase defence spending underlines a shared reality: without sufficient capabilities, Spain and Europe remain structurally vulnerable to strategic competitors and hybrid threats.

Energy

Energy supply is a fundamental pillar of the functioning of modern society and, by extension, of national security. The stable and affordable availability of energy shapes economic development, social well-being and the operational capacity of strategic sectors such as defence and industry. The armed forces depend directly on energy supply for their operational capability, while the industrial base requires continuous access to

trenes", 2025, <https://www.epochtimes.es/noticias/la-empresa-estatal-china-cosco-teje-su-red-de-control-en-espana-en-puertos-estrategicos-nodos-logisticos-y-trenes-18121.html>.

¹⁷ - Europa Press, "Los ataques a infraestructuras españolas, como el sector energético, aumentaron un 43% en 2024 y se mantienen en 2025", 2025, páginas 29-31, <https://www.europapress.es/portaltic/ciberseguridad/noticia-ataques-infraestructuras-espanolas-sector-energetico-aumentaron-43-2024-mantienen-2025-20250528141234.html>.

¹⁸ - Gobierno de España, Ministerio de la Presidencia, Justicia y Relaciones con las Cortes, "Informe Anual de Seguridad Nacional 2024", 2025, <https://www.dsn.gob.es/en/node/25659>.

electricity and fuels at competitive prices in order to maintain productive activity. In this sense, energy acts as a structural enabler of the other pillars of national security. Ensuring energy security is therefore not only a sectoral objective, but also a precondition for the functioning of the country's broader economic and strategic system. Moreover, a reliable and affordable energy supply constitutes an important lever for economic and industrial growth.

Beyond its basic role in the functioning of the economy, energy also represents a central pillar of strategic autonomy. Although the share of renewable energy in Spain's energy mix has increased in recent years, fossil fuels continue to dominate energy supply, accounting for approximately 67% of the total in 2024.¹⁹

This dependence creates vulnerabilities across the supply chain and restricts Spain's strategic autonomy. First, international oil and gas markets are highly exposed to price volatility, influenced by geopolitical factors such as the war in Ukraine, the current war in the Middle East, and global disruptions such as the COVID-19 pandemic. Second, a lack of diversification in energy imports increases vulnerability to foreign geoeconomic pressure, as illustrated by Russian gas diplomacy, which has influenced European energy policy for years and became even more prominent during the war in Ukraine.

To mitigate these risks and promote strategic autonomy, Spain, as a net energy importer, must develop strategies aimed at diversifying both its sources of supply and its energy mix. The diversification of fossil fuel suppliers reduces the potential impact of supply interruptions or geopolitical tensions. In this regard, Spain holds a relatively favourable position in Europe thanks to its network of regasification plants, which allow it to import liquefied natural gas, particularly from the United States.²⁰

Nevertheless, even with greater supplier diversification, fossil fuels remain exposed to volatility in global markets and raise long-term sustainability concerns. For this reason, the expansion of renewable energy constitutes a key element in strengthening energy-related strategic autonomy. Production based on domestic resources, such as solar and

¹⁹ - International Energy Agency, "Spain", s/f, <https://www.iea.org/countries/spain/energy-mix>.

²⁰ - SEGOVIA, Mikel, "España ha duplicado la compra de gas a EEUU durante el primer año de gobierno de Trump", 2026, <https://www.elindependiente.com/economia/2026/01/23/espana-ha-duplicado-la-compra-de-gas-a-eeuu-durante-el-primer-ano-de-gobierno-de-trump/>

wind energy, reduces dependence on external sources and contributes to emissions reductions.

The energy transition also introduces new strategic dependencies. Renewable technologies, advanced electricity grids and storage systems require CRMs, which are essential both for the deployment of clean energy and for ensuring the stability of the electricity grid. Moreover, as observed during the power outage in the Iberian Peninsula in 2025, an energy system fully based on renewables is not viable in the short term. It therefore remains necessary to maintain a balanced energy mix in order to guarantee security and stability of supply.

Consequently, ensuring energy security through supply diversification and a balanced energy mix represents a central element in strengthening Spain's strategic autonomy and national security.

Defence

Strengthening the defence capabilities of Spain and Europe depends on secure and stable access to critical raw materials, which are essential inputs for advanced systems, technologies and military equipment. The availability of these materials shapes response capacity and the credibility of deterrence against hybrid threats.²¹

NATO has identified twelve priority CRMs (Table 1), used in aircraft and battle tanks, missiles, submarines, corvettes, artillery and ammunition.²² Among these, aluminium and graphite stand out due to their lightness, mechanical strength and thermal stability, which make it possible to manufacture robust and technologically advanced equipment. Other materials, such as germanium, gallium and rare earths, are essential for sensors, radars, electronic systems and missile guidance.

Table 1. List of NATO defence-critical raw materials, their defence applications, leading global producer and NATO supply risk assessment

NATO defence-critical raw material	Military application	Leading producers ²³	global	NATO supply risk assessment
Aluminio	Fighter aircraft, main battle tank, missile,	Extraction: 27,2%	Australia	Very high risk

²¹ - NATO, "NATO's role in defence industry production", 2025, <https://www.nato.int/en/what-we-do/deterrence-and-defence/natos-role-in-defence-industry-production>

²² - NATO, "NATO releases list of 12 defence-critical raw materials", 2024, <https://www.nato.int/en/news-and-events/articles/news/2024/12/11/nato-releases-list-of-12-defence-critical-raw-materials>

²³ La producción se refiere a la producción total del mineral, no solamente de uso militar.

Lorenzo Casullo, Europe Regional Director, WSP and Erlend Sundsdal Hansen, Critical Raw Materials Consultant, WSP

	submarine, corvette, artillery, ammunition, torpedo Aviones de combate, carros de combate, misiles, submarinos, corbetas, artillería, munición, torpedos	Refining: China 55,1%	
Berilio	Fighter aircraft, main battle tank, artillery, ammunition	Extraction: United States 64,3%	High risk
Cobalto	Fighter aircraft, missile, submarine, corvette	Extraction: Democratic Republic of Congo 69,2% Refining: China 77%	High risk
Galio	Fighter aircraft, main battle tank	Refining: China 95%	Medium risk
Germanio	Fighter aircraft, main battle tank, artillery, ammunition	Refining: China 73,9%	High risk
Grafito	Fighter aircraft, main battle tank, submarine, corvette, artillery, ammunition	Extraction: China 65,5%	Very high risk
Litio	Fighter aircraft, missile, submarine, corvette, torpedo	Extraction: Australia 48,9% Refining: China 69,2%	Medium risk
Manganeso	Fighter aircraft, missile, corvette, torpedo	Extraction: South Africa 33,5% Refining: 67,6%	Medium risk
Platino	Fighter aircraft, submarine,	Extraction: 72,9%	High risk
Elementos de tierras raras	Fighter aircraft, main battle tank, missile, artillery, ammunition	Extraction: China 59,9% Refining: China 87,8%	Medium and high risk
Titanio	Fighter aircraft, missile, submarine, corvette, ammunition	Extraction: China 31%	High risk
Tungsteno	Fighter aircraft, main battle tank, missile, submarine, corvette	Extraction: China 75,5%	High risk

Source: Author's own elaboration based on data from NATO ²⁴ and the European Commission's RMIS — Raw

²⁴ - NATO, "NATO releases list of 12 defence-critical raw materials", 2024, <https://www.nato.int/en/news-and-events/articles/news/2024/12/11/nato-releases-list-of-12-defence-critical-raw-materials>

*Materials Information System.*²⁵

These raw materials are not critical solely because of their technological importance, but also because of the vulnerability of their supply chains. Extraction, and especially processing and refining, are geographically concentrated and exposed to geoeconomic tools in a context of strategic rivalry. Germanium is a clear example, given its high supply risk resulting from its strategic use in military applications, China's dominance of around 74% of global refining, and the export restrictions imposed since 2023 alongside gallium,²⁶ including temporary bans and controls on dual-use military products.²⁷

The consequences of these restrictions are direct. Dependence on China for germanium, gallium and rare earths creates delays in the production of radar systems and advanced missile technologies.²⁸ China supplies 100% of the heavy rare earths and 85% of the light rare earths used in the EU, including in missiles, where neodymium, praseodymium, samarium and dysprosium are key for permanent magnets and thermal stability.²⁹ In addition, in 2025, only 13.5% of European export licence applications were approved, causing bottlenecks in the defence industry.³⁰ The impact on the sector is damaging, given its high direct dependence on Chinese supply and its indirect exposure to restrictions aimed at the United States, which may affect European producers with contracts with US defence companies.³¹ These disruptions affect production for the war effort in Ukraine and pose a risk to the viability of the ReArm Europe Plan and the acceleration of Europe's defence industry.³²

²⁵ - European Commission, "RMIS – Raw Materials Information System", s/f, <https://rmis.jrc.ec.europa.eu/>

²⁶ - RISSE, Marius, ANGELES, Fiama, ASIKAINEN, Anttoni, "China's Export Controls on Critical Raw Materials, Including Rare Earths", 2025, <https://globaltradealert.org/blog/chinese-export-controls-on-critical-raw-materials-inventory>

²⁷ - YAO, Kevin, JACKSON, Luis, "China halts ban on gallium, germanium, antimony exports to US, but controls remain", 2025, <https://www.reuters.com/world/china/china-suspends-ban-exports-gallium-germanium-antimony-us-2025-11-09/>

²⁸ - MCNEIL, Harry, "No minerals, no missiles: the supply chain crisis impacting defence", 2025, <https://www.mining-technology.com/features/critical-minerals-supply-chain-crisis-defence/?cf-view&cf-closed>

²⁹ - HINTERMAYER, Niklas, HMAIDI, Antonia, "China's rare-earths export controls hit EU rearmament – but open a strategic window", 2025, <https://merics.org/en/comment/chinas-export-controls-hit-eu-rearmament-open-strategic-window>

³⁰ - CHENG, E., "China keeps tight grip on rare earths, costing at least one company 'millions of euros'", 2025, [China keeps tight grip on rare earths, costing at least one company 'millions of euros'](#)

³¹ - HACKETT, James, et. al., "Critical Raw Materials and European Defence", 2025, [iiss critical-raw-materials-and-european-defence_25032025.pdf](#)

³² - GEHRKE, Tobias, OERTEL, Janka, "Escalate to negotiate: How Europe should respond to Chinese export restrictions", 2025, <https://ecfr.eu/article/escalate-to-negotiate-how-europe-should-respond-to-chinese-export-restrictions/>

Spain, as a member of NATO and the EU and with an expanding defence industry, is also exposed to these vulnerabilities. Companies such as Airbus Defence and Space Spain, Navantia and Indra depend on complex supply chains for the production of aircraft, vessels and advanced electronic systems for sale and use within the EU and NATO, the availability of which may be compromised by supply disruptions.³³ Without such availability, sustaining the potential growth of this sector becomes more difficult.

Industry

At the same time, European and Spanish industry cannot do without CRMs as a key input in many of its production processes: from the aerospace and defence sectors to the energy sector — both addressed in this article — but also in the digital, chemical, metallurgical and automotive industries. Taken together, these sectors account for 15% of gross value added in Spain, according to 2023 data from the National Statistics Institute (INE).³⁴

Europe and Spain's aspiration for reindustrialisation is constrained if the CRMs required by these sectors are not available. As underlined in the previous section, for many of the same CRMs required by both defence and industry, there is no domestic supply chain — covering extraction, refining and recycling. On the contrary, there remains an almost total dependence on a small number of third countries, such as China and the Democratic Republic of Congo.

The digital industry, which aims to act as a lever for national innovation and technological development, requires copper and tin for wiring and electronics on the one hand, and for soldering and circuits on the other. Emerging sectors, which may provide an important long-term competitive advantage, also have very pronounced dependencies. Semiconductors and chips, for example, require silicon, gallium, germanium, indium and arsenic, as well as tantalum and palladium in electronic components and connections. Silicon underpins integrated circuits, while Ga, Ge, In and As are used in compound semiconductors, radiofrequency technologies, LEDs, lasers and other optoelectronic

³³ - La Razon, "La industria de defensa llega a cifras récord al facturar 16.000 millones", 2026, https://www.larazon.es/espana/industria-defensa-llega-cifras-record-facturar-16000-millones_2025101568ee84c1e81f41796950aab2.html

³⁴ - Instituto Nacional de Estadística (INE), "Instituto Nacional de Estadística", s/f, <https://ine.es/index.htm>

applications.

The chemical and metallurgical industries represent another key sector for the Spanish economy and are heavily dependent on CRMs such as nickel, used both as a catalyst in specialised chemical processes and as a necessary material for ensuring the production of high-quality stainless steel. Rare earths, whose refining is almost entirely concentrated in China, are not only fundamental to processes in more traditional industries such as petrochemicals, but also to the production of permanent magnets.

In turn, these fuels, materials such as steel, and components such as permanent magnets are key inputs for the automotive industry, which comprises nine multinational groups and 18 plants in Spain.³⁵ In this sector, CRMs such as platinum and aluminium are essential for the production of conventional vehicles and their control systems. In addition, the new generation of electric and hybrid vehicles requires lithium for battery cathodes, as well as cobalt, nickel, manganese and/or aluminium, iron and phosphorus in varying proportions depending on the battery chemistry.³⁶

Considering Spain's potential for CRM extraction and circularity, it is also important to assess the contribution that a revival of mining activity, as well as the potential for CRM recycling and refining, could make as an industrial opportunity capable of generating economic growth while also increasing the security of supply chains — as underlined by the Critical Minerals Production Alliance launched by the G7³⁷ in 2025.

In conclusion, European and Spanish industry would be strengthened if its excessive dependence on highly concentrated supply chains were diversified through a joint public-private effort that also included the revival of national extractive capacity. The Spanish Government is moving in this direction with the approval of the first national strategic instrument in this field in 40 years, designed to organise, promote and modernise the development of the sector: the 2026–2030 Action Plan for the Sustainable Management of Critical Raw Materials.³⁸ Diversification would benefit the competitiveness of key

³⁵ - Invest in Spain (s/f), <https://www.investinspain.org/es/sectores/automocion-movilidad>

³⁶ - RAUGEI, Marco, et al., "Final report: Environmental Sustainability and Energy Efficiency of EVs", 2024, https://www.fiaregion1.com/wp-content/uploads/2024/12/Final-report_Environmental-Sustainability-and-Energy-Efficiency-of-EVs_23-Sep-2024.pdf.

³⁷ - Brownstein, "G7 Announces First Round of Investments in Critical Minerals", 2025, <https://www.bhfs.com/insight/g7-announces-first-round-of-investments-in-critical-minerals/>.

³⁸ - MITECO, "El Gobierno aprueba el I Plan de acción para la gestión sostenible de las materias primas minerales

sectors today and even more so in the future, with growth expected from the production of batteries, semiconductors, chips and other emerging sectors.

Energy

The deployment of renewable energy offers the promise of a more diversified energy system, reducing traditional dependencies on volatile markets and the geopolitical tensions associated with fossil fuels, thereby strengthening the EU's strategic autonomy. However, the acceleration of the energy transition also introduces new vulnerabilities, stemming from the central role of CRMs as essential inputs in clean technologies.

Global demand for these raw materials is expected to grow significantly in the coming decades. For example, demand for graphite used in large-scale energy storage is projected to increase sixfold between 2024 and 2050, while demand for copper could increase up to tenfold over the same period, according to the International Energy Agency.³⁹

Raw materials such as lithium, cobalt, nickel, rare earths, copper and platinum group metals are fundamental to these technologies. Lithium, for instance, is a key input in the production of batteries for electric vehicles. The EU's high level of external dependence, with a very significant share of these materials imported from China,⁴⁰ exposes it to geopolitical risks and to potential disruptions resulting from export restrictions and price volatility.

Similarly, the development of green hydrogen is expected to drive demand for materials such as iridium, with estimated increases of 50% in the EU and up to 250% globally before 2030, due to its use in electrolyzers.⁴¹ In this context, the high concentration of production, with South Africa accounting for approximately 93% of global supply,⁴² together with price volatility, heightens the vulnerability of European supply chains and increases the risk of

2026-2030, ligado a una inversión de 414 millones", 2026, <https://www.miteco.gob.es/es/prensa/ultimas-noticias/2026/marzo/el-gobierno-aprueba-el-i-plan-de-accion-para-la-gestion-sosteni.html>.

³⁹ - International Energy Agency, "Global Critical Minerals Outlook 2025", 2025, <https://www.iea.org/reports/global-critical-minerals-outlook-2025>

⁴⁰ - European Commission, "Opening speech by President von der Leyen at the Clean Tech Industry Dialogue", 2024, https://ec.europa.eu/commission/presscorner/detail/ne/speech_24_977.

⁴¹ - JRC, "Supply chain analysis and material demand forecast in strategic technologies and sectors in the EU – A foresight study", 2023, <https://publications.jrc.ec.europa.eu/repository/handle/JRC132889>.

⁴² - European Commission, "RMIS – Raw Materials Information System", s/f, <https://rmis.jrc.ec.europa.eu/eu-critical-raw-materials>.

bottlenecks in the deployment of these technologies.

The projected increase in demand over the coming decades, combined with persistent vulnerabilities across the value chain and limited recycling and production capacity at European level, represents a threat to the security and sustainability of CRM value chains, as well as to the competitiveness of clean industries.

In this context, ensuring secure and stable access to CRMs becomes a key element of energy security. Energy security based on a more balanced and resilient mix is, in turn, an enabling condition for industrial growth and defence production. To this end, it is necessary not only to diversify external sources of supply, but also to strengthen domestic and European capacities in extraction, processing and recycling, in order to guarantee more stable access to CRMs. In an environment of growing global competition for control over these value chains, energy security and access to CRMs are becoming increasingly closely interlinked, jointly enabling the functioning of the country's economic and strategic system.

Conclusion

The same raw materials that are critical for the defence sector are also fundamental to the industrial and energy resilience of Spain and Europe. Without a stable and secure supply of these critical raw materials, it will not be possible to achieve the necessary defence capabilities or credible deterrence against hybrid threats; nor will it be possible to meet the objectives and targets of European and Spanish reindustrialisation, or to accelerate the green transition and ensure energy security. CRMs are therefore foundational pillars for strengthening these three levers of national security. However, their growing economic importance, global competition for access to them, and the vulnerabilities present throughout their value chains put this objective at risk.

Ensuring a stable supply of CRMs, strengthening value chains and reducing dependence on third countries is the only viable national security option in the face of geopolitical competition for the control and use of these resources.

Spain and Europe could position themselves from a place of strength by taking proactive initiative, closing the gap with other geoeconomic blocs such as China, and moving more quickly and with greater strategic coherence towards strategic autonomy. The benefits

for society and the economy extend beyond security: they include greater industrial competitiveness and innovation, both of which are linked to the development of dual-use civilian and military technologies.

This requires a long-term vision, built on pillars that transcend political cycles and recognise the importance of measuring, assessing and avoiding dependencies in CRM supply chains, including in emerging sectors that form part of transformative trends such as electrification and digitalisation.

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