



ASPEN – GMF
BUCHAREST FORUM

BREAKING THE DEPENDENCY TRAP: SECURING CRITICAL-RAW-MATERIALS SUPPLY FROM THE BLACK SEA TO THE BALTIC SEA

ASPEN-GMF BUCHAREST FORUM 2025 POLICY PAPER
Constantin-Alexandru Manda, Aspen-GMF Bucharest Forum Fellow



INTRODUCTION

Europe wins the energy transition only if it treats critical raw materials as a front-line security file, not a procurement afterthought. The same magnets, semiconductors, and specialty metals that power EVs and grids also underpin precision munitions and sensors; supply shocks therefore spill over from climate targets to defence readiness.

This paper maps how Europe, especially Romania and NATO's Eastern Flank, can avoid replacing dependence on Russian gas with exposure to a China-centric midstream. It assesses the CRMA's limits, the leverage of export controls, and the logistics reality of the Three Seas corridor, then lays out a potential Romanian-Polish playbook: bankable projects, non-Chinese refining, green-lane mobility, and dual-use offtake anchored in Romanian-Polish cooperation.

FROM GREEN TRANSITION TO DEFENCE: CRITICAL RAW MATERIALS AS EUROPE'S NEW SECURITY CHALLENGE

Global demand for several critical raw materials is projected to at least double by 2030 under current energy transition policies, yet mining and refining are heavily concentrated in just a few countries. This concentration has turned supply chains into geopolitical leverage points. Europe must avoid replacing Russia's gas with a China-centric midstream: Worldwide, China refines ~60% lithium, ~75% cobalt, ~35% nickel, ~90% REEs, and >97% anode active material, shares that convert mid-stream dominance into strategic leverage over the supply chains in energy and defence¹.

Since 2023, Beijing has tightened controls on gallium, germanium, and graphite (permit regime), and in 2024–2025 expanded export licensing and regulatory oversight across rare earths. China accounted for nearly 80% of refined gallium and almost 60% of germanium output, weaponizing the critical dependencies through these curbs². These measures are reflected instantly in the economics of the energy transition, as price spikes or shortages of minerals directly slow down renewable energy and battery deployment. Meanwhile, average mine lead time >16 years from discovery to first production, which make supply unresponsive when demand surges³. Put simply, security of supply with critical raw materials now sets the speed of the transition.

For NATO's Eastern Flank, security of the CRMs supply chain is now part of deterrence calculus. On Romania's Black Sea front, any disruption to defence-relevant inputs: rare-earth magnet oxides, titanium, or radar-grade gallium/germanium, translates into delayed maintenance cycles and slower force regeneration, not just missed transition targets. Export controls are already used coercively, and defence planners increasingly treat materials availability as a readiness constraint alongside fuel and spares.

1. IEA (2022). [The role of critical minerals in clean energy transitions](#). International Energy Agency, Paris.

2. EAF (2025). Rockwell, Keith. [How China is weaponising its dominance in critical minerals trade](#). East Asia Forum.

3. IRENA (2023). [Geopolitics of the energy transition: Critical materials](#). International Renewable Energy Agency, Abu Dhabi

Romania's role, as the Black Sea gateway and a logistics hinge for the Danube–Constanța axis, places it at the centre of a continent-wide shift from “industrial policy” to “operational resilience,” where CRMA risk-preparedness and demand aggregation can be aligned with allied stockpiling practice to harden supply against shocks⁴.

The supply of critical raw materials is also a frontline for Europe's defence, while European militaries depend on the same magnets, semiconductors, and power electronics as EVs and turbines⁵. On the Eastern Flank, the Three Seas corridor and Ukraine's prospective role in allied value chains elevate CRMs to a security and deterrence issue, where resilience of materials determines resilience of Europe's energy systems and arsenal alike⁶.

At The Hague Summit, NATO updated the Defence Production Action Plan to hard-wire supply-chain resilience, linking multi-year procurement and stockpiling with the Alliance's December 2024 list of 12 defence-critical raw materials⁷. Leaders also set a 5% of GDP investment path by 2035, with up to 1.5% earmarked for resilience, industrial base and infrastructure, which directly supports materials security across munitions and sensors supply chains. Together, these steps operationalize CRM readiness inside Alliance planning..

HOW EUROPE RISKS TRADING ONE DEPENDENCY FOR ANOTHER

As noted in Chapter I, security of supply now sets the speed of Europe's energy transition. The EU's Critical Raw Materials Act (CRMA) tries to turn that insight into policy by 2030: at least 10% extraction, 40% processing, 25% recycling inside the Union, and a ceiling of 65% dependence on any single third-country supplier per strategic material. These numbers should be viewed as a political backstop, rather than an industrial plan.

From a security angle, two blind spots could lock in vulnerability: midstream concentration and coercive export controls. The CRMA's ≤65% rule applies “at any stage of processing,” which is essential, but Europe's pipeline means that by 2030 local supply would cover <20% of demand in nickel, lithium, copper, natural graphite and REEs, with most materials still <30% even after innovation levers, without major new projects.

Today, Europe remains farthest from the 40% processing and 25% high-purity recycling benchmarks for battery anode graphite, rare-earth magnet materials, and key battery metals. The EU is somewhat closer on extraction for a handful of projects, but overall domestic output covers only a small fraction of needs.^{9 10}

On lithium, the first EU converters (AMG's Bitterfeld-Wolfen and Rock Tech's Guben) together add only a few tens of thousands of tonnes per year, tiny against the expected approx. 700,000 t of European battery-grade demand by 2030¹¹. For graphite anodes, the EU still lacks commercial natural graphite refining; early capacity is mainly located outside the EU (e.g., Norway's Vianode), while China processes approximately 80% of the global natural graphite and >97% of anode active material.¹²

4. IPIS (2025). The EU Critical Raw Materials Act and the defence industry. International Peace Information Service, Antwerp.

5. IISS (2025). Hackett, James. Critical Raw Materials and European Defence. The International Institute for Strategic Studies.

6. RUSI (2025). Gregory, Farrel. Can the Three Seas Initiative Save the US-Ukraine Critical Materials and Minerals Deal. Royal United Services Institute.

7. https://www.nato.int/cps/en/natohq/news_231765.htm

8. GLOBSEC (2025). Bridging the Supply-demand Gap for Critical Raw Materials by 2030. GLOBSEC, Bratislava.

9. Hackett, Critical Raw Materials and European Defence

In rare earths, Solvay's restart in France and Neo's Narva magnet plant are significant, but 98% of the EU's rare-earth magnet demand is met by Chinese imports¹³. Recycling also trails the CRMA's 25% target: today's lithium-ion lines remain small, European feed capacity may exceed 400,000 t/yr only by around 2026, and one flagship 150,000 t/yr project has been pushed back to 2032, too late to ease this decade's bottlenecks.

Independent assessments converge on the gap between the EU and China. Industry modeling suggests that, even under a base-case pipeline of projects, Europe's "local supply" would satisfy only a single-digit to low-teens share of 2030 demand for battery-grade graphite, manganese sulfate, and rare-earth oxides, far from CRMA's processing and recycling targets¹⁴. Meanwhile, meeting global clean-tech demand by the mid-2030s still requires hundreds of new mines and midstream plants; capital, permitting, and skills remain the rate limiter, not geology¹⁵.

The contrast with China is stark. Beijing used 2023–2024 export controls on gallium, germanium, and graphite, and tightened technology controls on rare-earth refining, to signal that midstream dominance can be weaponized¹⁶. China's position rests on scale: it accounts for roughly four-fifths of graphite processing, about nine-tenths of rare-earth refining, and significant shares of lithium and cobalt processing. It has also accelerated its overseas mine stakes and processing hubs, deepening control over chokepoints.

In this context, the CRMA's 65% cap looks prudent but insufficient: if alternative ores still flow through Chinese processing, headline "supplier diversification" may mask persistent functional dependence.¹⁷

This is no longer only an industrial policy story. European defence readiness depends on the same materials as the energy transition, Neodymium magnets for precision actuators and sensors; titanium, aluminum, and copper for airframes and power systems; and graphite for munitions and advanced energetics¹⁸. The EU's Defence Readiness Omnibus and the ReArm Europe/Readiness 2030 blueprint explicitly flag raw-materials access as a bottleneck for scaling the European Defence Technological and Industrial Base.¹⁹

10. GIS (2024). Umbach, Frank. The race for critical raw material self-sufficiency. Geopolitical Intelligence Services

11. <https://amg-nv.com/investors/press-release/amg-hosts-successful-opening-of-europes-first-lithium-hydroxide-refinery/>; <https://rocktechlithium.com/en/rock-tech-awarded-strategic-project-status-by-european-commission/>

12. <https://www.vianode.com/news/vianode-inaugurates-via-one-the-worlds-most-sustainable-anode-graphite-plant-for-batteries-2>

13. <https://www.ft.com/content/c3fef6ff-ae3e-4881-9759-eafb0503a90b>

14. GLOBSEC (2025). Bridging the Supply-demand Gap for Critical Raw Materials by 2030. GLOBSEC, Bratislava.

15. EY (2024). Critical raw materials for the energy transition—How to Achieve the Targets. EY CESA Energy Center.

16. Rockwell, How China is weaponising its dominance in critical minerals trade

17. Umbach, The race for critical raw material self-sufficiency

18. HCSS (2023). Strategic Raw Materials for Defence Mapping European Industry Needs. The Hague Centre for Strategic Studies, Hague.

19. IPIS (2025). The EU Critical Raw Materials Act and the defence industry. International Peace Information Service, Antwerp.

The security spillover is immediate. European militaries compete with clean-tech for titanium, neodymium magnets, copper and graphite; NATO now flags critical materials as vital to “technological edge and operational readiness,” and Brussels’ Readiness 2030/ReArm Europe workstreams explicitly link raw-materials access to defence output. Meanwhile, a doubling in lithium or nickel lifts pack costs by approx. 6%, inflating both munitions-electrification and grid-storage bills.²⁰

The implication is clear: Europe risks swapping one systemic dependency (Russian pipeline gas) for another (a Chinese-centered mineral and processing system).

To avoid that trap, the CRMA targets must become floors, paired with faster permitting, de-risked finance for midstream plants, and deep alliances that build non-Chinese refining at scale. Otherwise, price spikes and export curbs will keep bleeding into capex for renewables and into munitions and platform delivery schedules alike.

RESILIENCE OVER RELIANCE: SECURING EUROPE'S CRITICAL RAW-MATERIALS SUPPLY

Europe’s capacity to deter, rearm and decarbonise will be set by concrete actions, not slogans. Beijing’s export controls on gallium, germanium, and graphite have demonstrated that chokepoints can be weaponized. A Chinese-centered midstream leaves Europe vulnerable to price spikes and license denials, particularly when defence and clean-tech demand converge.

Europe must therefore out-compete, not out-wait: convert the CRMA from targets into bankable projects; move ore to midstream along the Three Seas Initiative logistics spine from the Black Sea to the Baltic; and leverage Global Gateway/MSP finance to build value-adding partnerships in Africa, where Namibia (heavy REEs), the DRC (cobalt), Zambia (copper), Zimbabwe (lithium), Mozambique (natural graphite), South Africa (manganese/platinum group metals) and Morocco (phosphate) can anchor diversified, rules-based supply.

From targets to power projection. Actions to be implemented by the European Union:

1. Make CRMA's project investable, not aspirational. In this regard, the projects must have attached EIB/InvestEU guarantees, CAPEX/OPEX grants, and standardised offtake windows to CRMA Strategic Projects. Also, the European Commission must publish annual diversification scorecards against the ≤65% cap “at any relevant stage of processing”. This increases transparency and turns policy into lender-grade projects, thereby disciplining delivery.
2. Win with value-adding partnerships in Africa. Operationalise EU MoUs by co-financing in-country midstream (separation/refining): EU–Namibia (sustainable raw materials + hydrogen), EU–DRC/Zambia (Copperbelt value chains), and follow-on portfolios in Zimbabwe (lithium), Mozambique (graphite), South Africa/Gabon (manganese), and Morocco (phosphate) with transparent offtakes insulated from single-country chokepoints.
3. Backbone the Eastern corridor (3SI) as a security lane. EU must fund “green-lane” customs, dedicated rail slots and port security for CRM cargo on the Constanța–Gdańsk axis, integrating Ukraine-facing spurs when feasible; as well as align EU funds to pooled offtake windows that anchor Polish/Romanian midstream and defence demand.

4. Enforce permitting discipline and market transparency. The European Commission must hold Member States to single-window timelines; publish an annual CRMA “trajectory report” (capacity, diversification, recycling) with corrective measures if off-track
5. Substitute, recycle, and standardize. At the EU level, we must accelerate the circularity of magnets and battery materials recycling through EU standards and offtake credits, and priorities substitution R&D in defence-relevant alloys and magnet chemistries to reduce exposure to single-point failures.

North Atlantic Alliance. From lists to logistics. How to operationalize CRMs readiness?

Because access to defence-critical raw materials is now a hard readiness constraint, NATO must move beyond naming 12 priority materials²¹ to making supply security executable across planning, stockpiles, and mobility on the Eastern Flank. Accordingly, the Alliance have to:

1. Set war-reserve targets and run stress tests. The North Atlantic Council and Defence Planning Committee must set alliance-level reserve norms for gallium, germanium, graphite, and REE oxides and embed them in the NATO Defence Planning Process (NDPP). In turn, SACEUR and national defence ministries must conduct recurring disruption stress tests.
2. Create a standing CRM risk cell. The NATO Intelligence Fusion Centre, in concert with national economic security units, must establish a materials risk cell to share indicators on export controls, licensing denials, and port disruptions, issuing early-warning bulletins that trigger stockpile releases and rerouting.
3. Protect the Eastern spine as a logistics objective. NATO, together with national logistics commands and border/customs authorities, must incorporate 3SI corridors and nodes (Constanța–Gdańsk, Rail-2-Sea, Via Carpathia) into Military Mobility exercises, tasking convoy protection, cyber-hardening of REE/graphite plants and ports, and green-lane customs for CRM cargo. Host nations on the Eastern Flank must pre-designate secure rail slots and port berths for crisis surge.

EASTERN SPINE. A ROMANIA-POLAND PLAYBOOK FOR CRMS.

Romania sits at the intersection of geological potential, industry, and corridors: a natural anchor for Europe’s eastern strategy on critical raw materials. The European Commission’s first CRMA Strategic project list includes three Romanian projects on copper, magnesium, and graphite extraction²², evidence that credible mining projects exist if permitting and finance align.

A concrete pilot: the 3SI Constanța–Puławy Corridor. On the Romanian side, three CRMA-recognised projects give the upstream spine: Euro Sun’s Rovina (copper-gold), SALROM Baia de Fier (graphite), and Verde Magnesium (magnesium metal). These can feed a shared mid-stream anchored in Poland by the Puławy Rare Earths Separation Plant, also on the EU’s Strategic list, creating an EU node for neodymium-praseodymium oxide and magnet precursors.

20. IEA (2022). The role of critical minerals in clean energy transitions. International Energy Agency, Paris.

21. https://www.nato.int/cps/en/natohq/news_231765.htm

22. https://single-market-economy.ec.europa.eu/sectors/raw-materials/areas-specific-interest/critical-raw-materials/strategic-projects-under-crma/selected-projects_en

This upstream–midstream pairing is reinforced by demand already aggregating in Poland: LG Energy Solution's Wrocław complex has approx. 86 GWh/year capacity, and will assemble batteries for PGE's 263 MW/900 MWh BESS at Żarnowiec, slated for operation in 2027—an immediate offtake for copper foil, graphite anodes and (downstream) magnet materials.²³

Make the corridor physical: Rail-2-Sea, Via Carpathia and a bigger Constanța. 3SI's flagged Rail-2-Sea (Gdańsk–Constanța) and Via Carpathia give the north–south backbone to move concentrates and intermediates from Romania (and Ukraine-facing spurs) into Polish processing and final manufacturing²⁴. Constanța's container capacity has been materially expanded: a 2024 investment more than doubled container capacity, making it the natural Black Sea gateway for CRM cargoes on predictable schedules.²⁵

Security logic, not just industrial. NATO's December 2024 list of 12 defence-critical raw materials formalizes what defence planners already know: assured access to materials like titanium, rare earths and graphite is a readiness issue. IISS underlines that Europe must pair CRMA goals with stockpiles, diversified midstream and defence-relevant financing tools, otherwise the same bottlenecks will hit both the energy transition and defence programs.²⁶

A practical playbook (what to do, now).

- *Instrument 1: pooled offtake.* Bucharest and Warsaw should launch a joint, EU-compatible purchasing window for NdPr oxide from Puławy, graphite anode active materials linked to SALROM feed, copper foil from EU sources, and nickel sulfate, with standard ESG clauses and indexed pricing. This addresses the single-buyer risk that often stalls midstream FIDs.
- *Instrument 2: shared midstream hubs.* Treat Puławy as the rare-earth anchor, and site a Black Sea graphite-anode active line near Constanța to pull Romanian (and, when feasible, Ukrainian) feedstocks into EU refining, consistent with 3SI thinking on channeling Ukrainian titanium/graphite/manganese into allied chains.²⁷
- *Instrument 3: green-lane logistics.* Dedicate rail slots and port berths on the Constanța–Gdańsk axis (Rail-2-Sea/Via Carpathia), with 24/7 customs for CRM traffic and clear security protocols tied to Schengen requirements.

Turning geography into advantage: the Eastern corridor's payoff. This corridor shifts value-add inside the EU: Romanian ores/concentrates refined into magnet materials in Poland; graphite upgraded near Constanța; cathode/anode materials pulled into Polish gigafactories. It narrows exposure to single-country midstream chokepoints and aligns with CRMA diversification aims, while addressing transparency cautions raised around Strategic Project selection by embedding open, auditable offtake and logistics rules from the start.

23<https://www.energy-storage.news/lg-energy-solution-to-provide-bess-for-pges-263mw-900mwh-poland-project/>

24.https://projects.3seas.eu/projects/rail-2-sea-modernization-and-development-of-railway-line-gdansk%28pl%29-constantina-%28ro%29?utm_source=chatgpt.com

25.<https://www.reuters.com/markets/commodities/dp-world-romania-doubles-container-shipping-capacity-black-sea-port-2024-06-18/>

26.Hackett, Critical Raw Materials and European Defence

27. Farrell, Can the Three Seas Initiative Save the US-Ukraine Critical Materials and Minerals Deal

CONCLUSIONS

To avoid swapping Russia's pipelines for Beijing's midstream, Europe must move from targets to tonnage. The EU should treat CRMA benchmarks as floors and hard-wire delivery through EIB/InvestEU de-risking, standardized offtake, and annual diversification scorecards.

On the Eastern Flank, Romania and Poland must operationalize a Constanța–Puławy spine: site graphite and magnet precursors on EU soil, pool defence and clean-tech demand, and run “green-lane” customs with pre-designated rail slots on Rail-2-Sea/Via Carpathia. NATO should set war-reserve norms for REE oxides, gallium/germanium, and graphite, stress-test disruptions, and protect CRM plants and ports in Military Mobility drills.

Finally, Europe must co-finance value-adding midstream in Africa and Ukraine-facing spurs, scale high-purity recycling, and fund substitution R&D. In short: refine inside the alliance, diversify outside it, and stock what we cannot swiftly substitute.

