

# NATO

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## Research report

**Forum:** NATO

**Issue:** Addressing Strategic Dependence on Non-Allied States for Critical Infrastructure and Technologies while ensuring sovereignty

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## Introduction

NATO assures the security of its allies, defence at the time of offense towards any ally and of region at the time of normal duration. The primary intention of Washington Treaty- an aggression on an ally would be an aggression on the other allies, serves as one major distinctive feature of this organisation. But currently, the member state's major deficiencies cannot only be expressed as conventional but the allies may also face more strategic interdependence to the non member States like the Peoples republic of China, owing to our interdependence on them in respect of crude materials, electronic components and networks, networks and modern technology, nonavailability of these critically affect a combat readiness, and maintenance of certain crucial procedures and process such as networks of tele communications, power supply even up to the world economy, when any ally is incapable of providing her defence forces with updated weaponry, with enhanced radars, and aero engines due to various reasons of imports quotas or halted trade routes out of the purview and within the authority of the alliance.

A loss of sovereignty also occurs in the realm of coercion on the flow of supplies, as it does in the event of kinetically aggressive actions.

Hence, each and every ally has to try all avenues for minimising our dependence upon foreign countries by exploring additional avenues of supply, reinforcing our inherent infrastructure of local industrial power and the preeminence in technology and crucial processes, even with continued capacity to act collaboratively, however this should not be at the expense of capability nor the progress attained in the technology. The objective of the current report is therefore, to analyze the definition, its implications and figure it out as an economic problem; outline all the significant shareholders, as well as suppliers of these commodities; identify those prior measures undertaken and to present a diagram of these and the following courses of action

## Definitions of key terms

Strategic dependencies:

A situation whereby an Ally's access to basic defence, energy, digital or industrial capabilities is predominantly based on a single non-allied supplier or hub, exposing these capabilities to risks of coercion, disruption or supply denial.

Critical infrastructure:

The physical and digital systems which are the heart of national security and of the functioning of the Alliance, including power grids and interconnectors, communications networks (including 5G, and future 6G), transport and logistics hubs, cables, data centres, ports and defence-industrial facilities.

Defence-critical raw materials:

These are identified by NATO in December 2024 as necessary for defence capabilities of Allies. Twelve, namely aluminium, beryllium, cobalt, gallium, germanium, graphite, lithium, manganese, platinum, rare earths, titanium, and tungsten, can severely affect defense equipment if supply is disrupted.

Technological / Economic Sovereignty:

An Ally's and the Alliance's ability to take security and defence policy decisions freely without outside powers being able to levy costs from its dependence on non-allied partners via control of production, technology or infrastructure.

De-risking / Friend-shoring / Onshoring:

Approaches the purpose of which is to minimize concentration risk by diversifying suppliers, predominantly

toward the trusted partners (friend-shoring), or by boosting local / partner country production (onshoring).

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Also by building stocks and utilizing recycling capabilities whilst maintaining readiness to trade with non allies in a security risk managed manner.

SDGs 9 and 17:

SDG 9 aims for resilient infrastructure, industrialization and innovation.

It covers access for all to affordable electricity and electricity, access to essential services, infrastructure and transport, and increased industrial productivity.

SDG 17 focuses on the need for effective partnerships to meet the sustainable development goals including through financial and technical assistance, access to technology, support for capacity building. They are both important as the partners must ensure that the built infrastructure will not expose new strategic dependencies on external actors.

## General overview

### The nature of strategic dependence

What's 'strategic interdependence' What worked for everyone globally, via "efficient supply chains driven by globalisation," used to translate into lower costs. But now the trend is already long past its peak following the Cold War, the supply of many raw-material products, particularly to modern defense equipment and critical infrastructure elements, has become critically dependent on Chinese production and, to an increasing extent, processing. This was fostered through China's industrial policies, targeted subsidies, and its vertical control across the entire extraction processing – manufacturing pipeline.

Now, more than 60-70 percent of the world's rare-earth production, and still larger proportion - around 85-91 percent - of their processed product takes place within China, possibly higher in the cases of specific rare-earth-heavy substances, including magnets, "critical" raw-earth elements (REEs).

Nearly all gallium extraction (98 percent), nearly 60 percent of germanium extraction, and more than 70 percent of graphite (including battery-grade), along with substantial proportions of most extraction and processing materials - as also cobalt, lithium, tungsten, titanium, and aluminum - key ingredients for the magnets in aircraft, missiles, and modern computer/radar chips, are mined or manufactured with Chinese involvement. Outside these basic ingredients, there is still heavy use of communications equipment installed years ago from China, reliance of modern renewable energy chains (close to 98 percent of European solar-panel inputs are sourced from China, alongside battery-grade material, transformers, etc.), a pervasive Chinese footprint in dual-use and technology components - and pre-cursor drugs. China's willingness to apply pressure is evident in the 2023-25 tightened restrictions on the export of gallium, germanium and related technologies, and on REEs, with the Chinese explicit in their notification that export-controls were indeed designed, "for foreign military end-users," and "may contain extraterritorial aspects" that create both immediate supply risk, and longer-term uncertainty as rearmament plans take shape.

### Scale of dependence – selected data

Table 1: NATO Defence-Critical Raw Materials and approximate Chinese shares (recent estimates)

| Material            | Key defence / infrastructure uses                         | Approx. Chinese share             |
|---------------------|-----------------------------------------------------------|-----------------------------------|
| Gallium             | Advanced radars, missile guidance, high-performance chips | ~98% production                   |
| Rare Earth Elements | Permanent magnets, motors, guidance systems, sensors      | 60–70% mining / 85–91% processing |
| Graphite            | Batteries, structural components, thermal management      | >70% (esp. battery-grade)         |

|                         |                                                              |                                       |
|-------------------------|--------------------------------------------------------------|---------------------------------------|
| <b>Germanium</b>        | Infrared optics, night-vision, fibre optics                  | ~60%                                  |
| <b>Tungsten</b>         | Armour-piercing munitions, tooling, high-density components  | High mining & processing              |
| <b>Cobalt / Lithium</b> | Batteries for platforms and systems, high-performance alloys | Lower mining; high refining (~68–72%) |
| <b>Titanium</b>         | Aircraft structures, naval systems, missiles                 | Significant refining share            |
| <b>Aluminium</b>        | Aircraft frames, naval hulls, missile systems                | ~55% production                       |

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Sources: NATO (Dec 2024 list), USGS, European Commission, IEA and think-tank compilations 2024–2026.

### Policy recognition within NATO

The allies also committed at the 2025 Summit in The Hague to invest up to five per cent of GDP by 2035 towards their individual core defense requirements and towards defense and security related expenditure. Of this aggregate sum up to 1.5 per cent may cover defense and security related issues relating to critically endangered infrastructure, network defense, civil defense and readiness, development and defense production base reinforcement; whereas at least 3.5 per cent covers fundamental defense requirements and NATO Capability Targets. Therefore, space of fiscal and political will was already established to the supply chains defense measures and to securing of infrastructure,

On December 2024 NATO has issued a list of its twelve-defense critical raw materials. Work carried out under the framework of Revised defense production action plan and the December 2026 Ankara Defense Industry Forum has boosted projects carried out multinational entities in critical raw materials purchase, storing, transportation and logistics for production base.

## Major parties involved

### People's Republic of China

China is the key concentration risk. Driven by industrial policy, state aid and vertical integration it can extract dominance in extracting, processing and component manufacture of a range of defence-crucial materials and dual use technology. The export controls that have been implemented or strengthened from 2023 to 2025 and which has included restrictions that will include restrictions on foreign military end-users show a capability and a desire to weaponize supply-chain advantages. The role that China has played in supporting the Russian war effort using dual use components highlights that this is a strategically significant capability.

### United States of America

US largest defence spender and technological producer within the Alliance. Leading industrial policy response, namely CHIPS and Science Act, clauses within Inflation Reduction Act and use of Defense Production Act authorities, Minerals security partnership launched, stockpiles developed and exports of high tech, controlled. Push continues for Allies' fast de-risking, whilst US continues its own de-risk process through lessening dependence. U.S policy also influences the tech standards used within the E.U.

### European Allies and the European Union

EU Allies show substantial exposures in Critical Minerals, PV solar supply chains, batteries, and in a number of instances, legacy telecom infrastructure. For its Critical Raw Materials Act (2024), the European Union proposes the following not-binding 2030 targets: minimum 10 percent annual consumption from EU sources, at least 40 percent annual consumption processed in the EU, and recycling at 25 percent, along with an upper limit of 65 percent any given strategic CRMA to come from one third country. Instruments such as the Chips Act, ReArm Europe/ SAFE financing and national industrial strategies are closely related. It was in 2025 the Netherlands hosted the key Summit of The Hague which increased the 1.5 percent resilience envelope.

### Canada and resource-rich Allies and partners

Canada and other resource-endowed Allies (e.g. Australia, relevant partners) possess alternative supply chains for critical minerals. Canada stressed the whole-of-government approach which helps meet some NATO

requirements and its work on reserves and offtake. These partners can and should be at the centre of any realistic friend-shoring approach.

## **NATO as an institution**

From Awareness to Institutionalisation The progression of the field can be traced back to the identification of 12 key raw material substances for national defence in The Hague during December 2024; Updated Defence Production Action Plan in September 2024; and finally a launch of an international Critical Raw Materials for Defence program in November 2026. In terms of innovations in NATO's pipeline, including DIANA initiative, and Science and Technology Organization of NATO is becoming more actively involved into developing the capacities in substitutions and recycling and supply chain resilience. Role of NATO in this respect is mainly coordinating, risk-assessing and standardizing, but not controlling the industrial base.

## Timeline of Key Events

1949: Signing of the North Atlantic Treaty guaranteeing collective defense based on Article 5.

2010-2012 : China introduces rare earth export restrictions demonstrating early Western vulnerabilities and initiating talks on diversification.

2022: Russian invasion of Ukraine promotes European rearmament illustrating the price paid for the concentration of energy and industrial dependencies.

2023-2024: China tightens export control of gallium, germanium, graphite and other advanced technologies. EU approves the Critical Raw Materials Act. NATO Defence Ministers endorse the supply chain security strategy.

December 2024: NATO releases its official list of twelve defence-critical raw materials needed by the Allied defence industry.

June 2025: Hague Summit: Allies pledge to invest 5% of their GDP into defense and security until 2035, up to 1.5% of which may be allocated to critical infrastructures, resilience, innovation and defence industry.

2025 (continued): Further export restrictions by China including ones that apply to foreign military customers. Allied actions increase through stockpiling discussions, joint minerals agreements and national initiatives.

2026: Ankara Summit and Defence Industry Forum: launching of multinational Critical Raw Materials for Defence projects targeting acquisition, stockpiling, transportation and management of critical materials and recycled resources.

## Possible solutions

### Diversification and friend-shoring

Source key materials and components faster from Allies and like-minded partners. The production of alternative metals, critical minerals and magnets should be enabled via joint investment, long-term off-take agreements and, where appropriate, by mechanism of price support and demand aggregation. Expand cooperation with Canada, Australia, Japan, South Korea and a selection of Latin American and African partners.

### Domestic and Alliance capacity building

Leverage up to 1.5 per cent resilience corridor agreed at The Hague, in addition to national industrial policy to maximize extraction, refining, recycling and manufacturing capacity in the Euro-Atlantic area.

### Multinational stockpiling and demand aggregation

Focus should be put on the twelve NATO Materials and Technology areas (advanced semiconductors, secure networks, energy storage systems). Set up strategic reserves of critical materials and intermediates across the Alliance. Building on current fuel and ammunition practices. Aggregate Ally demand for critical materials so that new operations are commercial, and unit costs decline.

### Standards, trusted-vendor frameworks and infrastructure protection

Establish and implement NATO-appropriate infrastructure security standards to provide for secure 5G and 6G communications networks, cloud computing services, grid technologies, and other digital infrastructure. Avoid purchasing high-risk hardware; rigorously evaluate any investment in strategic assets. Include infrastructure assets like undersea cables, energy interconnections, major data storage centers, and critical ports as potentially relevant to a shared defense interest, to be jointly assessed and secured by NATO.

### Innovation, substitution and circularity

Use the Defence Innovation Accelerator for the North Atlantic (DIANA), national funding instruments and the NATO Science & Technology Organisation to increase speed of materials substitution, the development of more optimized designs and high recovery of recycling techniques. Circular economy strategies aimed at keeping critical materials within the Alliance further reduce net import of material and shorten logistics chains.

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### Coordinated economic-security instruments

Makes sure that allies export control and screening of inwards investment, anti-coercion and public-procurement preferences are aligned. Opening doors to pragmatic and practical engagement with China for as long as trade with them makes sense under constrained security risks and we are not too exposed. Increase of pragmatic cooperation with EU on applying the Critical Raw Material Act, with in the Indo Pacific on standards, supply chain resilience, etc.

### Accountability and metrics

Incorporate measures for the resilience of supply chains and critical infrastructure into national and NATO reporting schedules. Perform regular risk assessments of the defense industrial base and infrastructure interdependencies in the Alliance. Metrics facilitate political accountability and help monitor progress in meeting the Hague objectives on investment.

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