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# **CRM Stress Test: Rare Earths, Tungsten and Gallium**

Six Escalation Waves since August 2023 -  
the Consolidation Phase 2026/27

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*The discussion around Critical Raw Material risks tends to focus on battery inputs. The real vulnerability of the DACH mid-market (Germany, Austria, Switzerland) sits deeper and runs through drives, tooling and power electronics in equal measure. Rare earths, tungsten and gallium cover three production layers and hit the same mid-sized manufacturer at three points of its bill of materials, with China as the common bottleneck. What still looked like a 2027 forecast in 2024 has been reality since February 2025, and on 10 November 2026 the suspensions agreed in the Trump-Xi deal expire, leaving Beijing to decide whether to reactivate them.*

## The escalation is already under way

The EU Critical Raw Materials Act (2024) defines strategic raw materials and procurement targets, while China has been tightening its export controls at a frequency that retrospective analyses struggle to capture: gallium and germanium since August 2023, antimony since September 2024, tungsten and four further metals since February 2025, seven medium and heavy rare earths since April 2025 (Announcement 18), the October wave of 9 October 2025 with an extension by five additional elements (Announcement 57) as well as the FDPR-style 0.1 % rule (Announcement 61), and finally in January 2026 the centralisation of tungsten exporters together with a Japan-specific dual-use ban. In total this amounts to six escalation waves in 29 months.

On 30 October 2025, Trump and Xi closed a deal in Busan that took effect through MOFCOM notices 70 and 72 of 7 to 10 November 2025. The entire October wave (Announcements 55, 56, 57, 58, 61 and 62) is suspended until 10 November 2026 and the US-specific dual-use ban on Ga/Ge/Sb until 27 November 2026. What continues to apply unchanged, however, are the global licensing requirements for Ga/Ge (2023), antimony (2024) and tungsten (February 2025), together with the seven medium and heavy rare earths from Announcement 18 (April 2025) and the tungsten exporter centralisation from January 2026. 2027 therefore does not mark the start of a hypothetical stress test but the consolidation phase of a structural shift that has already taken place.

## EXHIBIT 1

# China's export control escalation: a chronology

### AUG 2023 Ga/Ge licence

Global licensing requirement for **gallium and germanium**. First direct raw-material restriction against Western industry.

### SEP 2024 Antimony licence

Global licensing requirement for **antimony** (MOFCOM announcement in August). Supplemented in December 2024 by a US-specific total ban.

### FEB 2025 Tungsten + 4 metals

MOFCOM/GAC Decision No. 10/2025: export controls on **tungsten, tellurium, bismuth, molybdenum and indium**. Chinese APT exports collapsed by around 70 percent in 2025.

### APR 2025 7 medium/heavy REE

Announcement 18: export controls on seven **medium and heavy rare earths** (samarium, gadolinium, terbium, dysprosium, lutetium, scandium, yttrium). NdFeB magnets doped with Tb or Dy are also captured. Neodymium itself remains nominally free but is indirectly captured through the magnet pathway.

### OCT 2025 October wave (Ann. 55-62)

Six MOFCOM notices issued on the same day. **Announcement 57**: extension to **holmium, erbium, thulium, europium, ytterbium**. **Announcement 61**: **FDPR-style 0.1% rule**. Products with any Chinese REE share become subject to controls globally, including components in DACH supply chains.

### NOV 2025 Trump-Xi deal

**Trump-Xi deal**: suspension of the entire October wave (Announcements 55, 56, 57, 58, 61 and 62) until 10 November 2026 and of the US-specific dual-use ban on Ga/Ge/Sb until 27 November 2026. MOFCOM notices 70 and 72 (7 to 10 November 2025). In return, China is to issue general export licences for US end users and their global suppliers. What continues: Announcement 18, the tungsten, antimony and Ga/Ge licensing requirements.

### JAN 2026 Tungsten centralisation

China designates **15 authorised tungsten exporters**, further centralising the exporter pool. In parallel a **Japan-specific tungsten ban** for dual-use military end users. APT exports from China in January and February 2026 close to zero. Tungsten prices up around **557 percent** since February 2025 (Bloomberg / Fastmarkets, cut-off March 2026).

### NOV 2026 End of suspension

**End of the suspension**. The suspension of the October wave (Announcements 55-62) expires on 10 November, the US dual-use ban on 27 November. Decision on extension or return of the suspended restrictions in a setting where the underlying controls (Announcement 18, tungsten, antimony, Ga/Ge) are already in force.

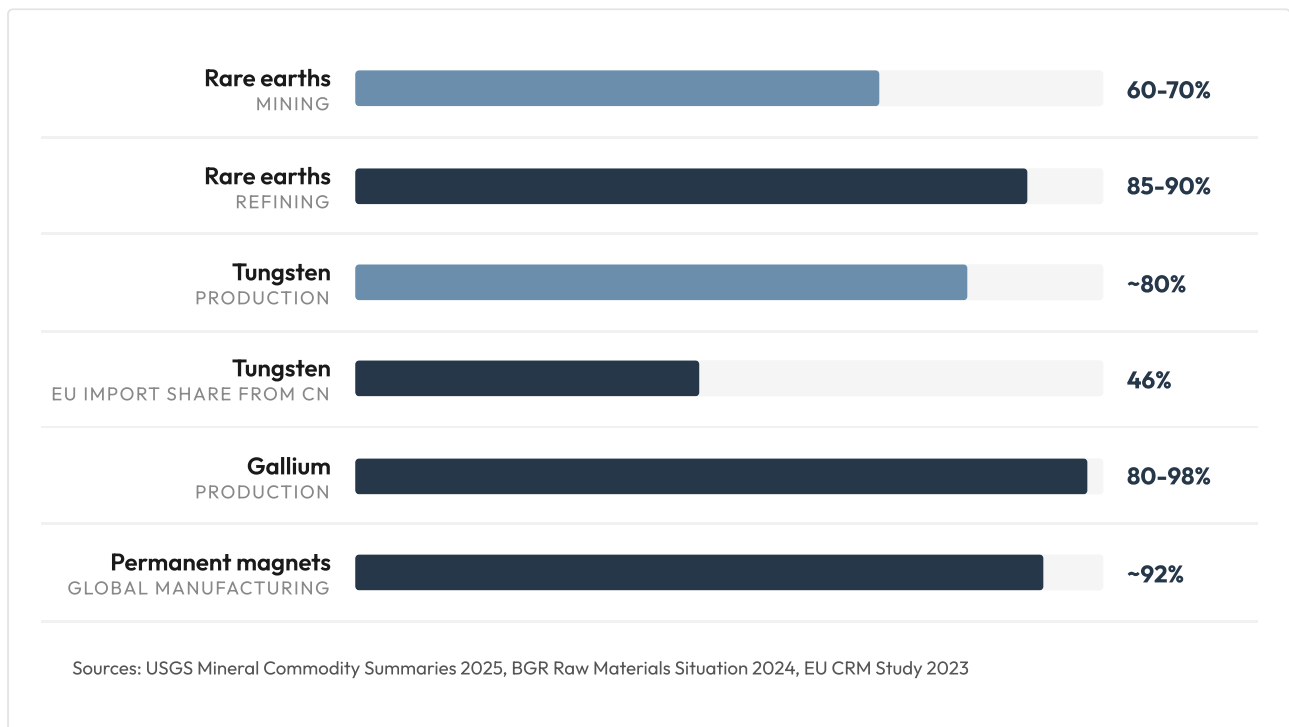
### 2027+ Consolidation

Consolidation phase: negotiated licensing regimes become routine, the first EU Strategic Projects reach pilot volumes, industrial scaling of countermeasures remains 3 to 5 years out.

## Understanding the concentration: China's dominance in numbers

Europe's dependence on Chinese raw materials is not a new topic. What is often underestimated is the scale of concentration along the entire value chain, from mining via refining to component manufacturing.

### EXHIBIT 2



The chart shows a consistent pattern: China's share rises along the value chain. For rare-earth mining it sits at 60 to 70 percent, for refining at 85 to 90 percent, for magnet manufacturing above 90 percent. The real dependency lies not in the raw material, but in the processing capacity.

## Three layers, one vulnerability

Rare earths, tungsten and gallium are not a random trio. They cover three layers of a typical machinery or drive-technology manufacturer and therefore hit the same company simultaneously at three sensitive points.

EXHIBIT 3



For machinery, drive technology and industrial automation companies, this means a single geopolitical escalation step can hit all three production levels at once. This is not a theoretical scenario, it is a structural vulnerability embedded in the bill of materials.

## Substitution options compared

Substitution of critical raw materials is possible, but never cost-neutral and rarely performance-equivalent. Five substitution paths across the three materials:

MATERIAL	SUBSTITUTE	PERFORMANCE VS. ORIGINAL	COST EFFECT	AVAILABILITY
<b>Tungsten (WC)</b>	CBN, ceramics	<b>70-80% (application-dependent)</b>	+20-40%	Good
<b>Neodymium (NdFeB)</b>	Ferrite magnets	<b>30-40%</b>	-50%	Good
<b>Neodymium (NdFeB)</b>	SmCo magnets	<b>85-90%</b>	+200-300%	Sm + Co both CRM
<b>Gallium (GaN)</b>	SiC (silicon carbide)	<b>Comparable</b>	+30-50%	Growing
<b>Gallium (GaAs)</b>	InP (indium phosphide)	<b>Application-dependent</b>	+50-100%	Niche

Assessment based on industrial practice and technical literature. Performance comparison refers to the relevant main application.

# The risk profile: where the dependency sits

## Tungsten: the blind spot in the tooling chain

01

China controls around 80 percent of global tungsten production. The EU sources 46 percent of its tungsten imports directly from China (Eurostat 2023), with another 30 percent indirectly via Vietnam, where Chinese concentrates are further processed. Since February 2025 tungsten has also been subject to Chinese export controls, and in January 2026 the exporter pool was centralised to 15 authorised firms. APT exports from China collapsed by around 70 percent in 2025 and were close to zero in January and February 2026. The tungsten price is up around 557 percent since February 2025. Carbide cutting tools are indispensable in metal machining. Substitution by CBN or cutting ceramics is selectively possible by application, mainly in the finishing of hardened steels, not as a blanket replacement for the tungsten tool line. Most mid-market companies do not know how high their actual tungsten content is in the bill of materials, because the material disappears into purchased parts and wear components.

## Rare earths: from the magnet to the motor

02

China controls 60 to 70 percent of mining and 85 to 90 percent of refining of rare earths. Neodymium and dysprosium are the critical elements for permanent magnets in electric motors. Since April 2025, seven medium and heavy rare earths have been directly subject to export controls (Announcement 18), including terbium and dysprosium. Neodymium itself is nominally free, but almost every high-performance NdFeB magnet contains Tb or Dy doping and is therefore captured. Without these magnets, there are no high-performance drives in electric vehicles, wind turbines and industrial servo systems. Ferrite-based alternative magnet concepts exist, but only reach 30 to 40 percent of the energy density of an NdFeB magnet. For compact high-performance drives, this is not an option.

## Gallium: the quiet escalation

03

China produces 80 to 98 percent of the world's gallium. Since August 2023 a global licensing requirement applies to gallium exports, affecting EU buyers throughout. In December 2024 an additional US-specific dual-use ban was added, suspended from the Trump-Xi deal of 30 October 2025 until 27 November 2026. The global licensing requirement remains untouched. Gallium nitride (GaN) is used in power electronics and competes there with silicon carbide and silicon IGBTs. In industrial frequency converters, GaN is not yet dominant. Gallium arsenide (GaAs) serves primarily RF and microwave applications: mobile-phone power amplifiers, radar, satellite communications, optoelectronics. Without gallium it is less the motors than the communication and control interfaces that fail. On top of this sits a structural mechanism that is especially pronounced in Europe: the ongoing electrification raises gallium demand in power and RF components and therefore deepens dependence on the same supplier that is tightening controls.

## Geopolitical scenarios: where the stress test is heading

The escalation since 2023 has shifted the baseline. Licensing requirements currently apply to gallium, antimony, tungsten and the seven medium and heavy rare earths from Announcement 18. The five additional elements from Announcement 57 (holmium, erbium, thulium, europium, ytterbium) and the FDPR-style 0.1 % rule from Announcement 61 are, as part of the October wave, suspended in the Trump-Xi deal until 10 November 2026 but can be reactivated at any time. The relevant question for risk planning is therefore no longer if, but how the next stage unfolds. The historical benchmark is the Senkaku crisis of 2010: NdPr oxide prices rose by a factor of 7 to 10 within months, and the market took around three years to recover. Back then this was a shock, today it would be an acceleration of a movement already under way.



### SCENARIO A

MODERATE

#### Return of the FDPR rule after November 2026

The October wave suspended in the Trump-Xi deal (Announcements 55-62, including the FDPR-style 0.1 % rule from 61 and the five additional rare earths from 57) and the US total ban on Ga/Ge/Sb return once the suspension expires on 10 and 27 November 2026. Licences for materials already under control (tungsten, antimony, the seven REEs from Announcement 18) are issued more restrictively, NdFeB magnets with Tb/Dy doping become globally captureable through the magnet pathway. The willingness to negotiate seen in the interim (general export licences for US end users) lapses as soon as the suspension is not extended.

**IMPACT** Price increases of 30 to 80 percent within 6 months, benchmarked against the documented reaction of tungsten APT prices after February 2025. Lead times double, licence approvals become the bottleneck resource. Smaller mid-market companies without long-term contracts or approved Chinese direct suppliers lose access first - in practice within the first 8 to 12 weeks after re-entry into force.



## SCENARIO B

SEVERE

### Taiwan crisis as catalyst

A military escalation in the Taiwan Strait leads to Western sanctions against China. Beijing responds with a complete export stop on strategic raw materials and selected semi-finished products. Any incident touching the US defence perimeter qualifies as trigger: targeted blockade of the ADIZ, exercise patterns that close shipping routes, or a Chinese seizure of forward islands. In each case, Brussels and Washington will have to respond - China has been preparing the escalation mechanism systematically since August 2023.

**IMPACT** Deliveries come to a halt almost overnight, while DACH mid-market companies typically hold only 2 to 6 weeks of safety stock for carbide and magnet material and therefore, without strategic reserves, grind to a halt within 8 to 12 weeks, with no short-term substitute available. The production line tends to fail in a characteristic sequence: first control (gallium semiconductors with short inventory reach), then drive (the magnet buffer lasts longer), and finally tooling, whose carbide wear only builds up over weeks.



## SCENARIO C

STRUCTURAL

### Controlled scarcity

China does not reduce exports openly, but increasingly redirects refining capacity to the domestic market. Availability for European buyers declines gradually, without a clear escalation moment. Leading indicators are more frequent revisions of the authorised-exporter lists, shorter validity periods of issued licences, and a widening gap between official customs statistics and actual deliveries. Because no single event acts as trigger, political justification for counter-measures is missing - vulnerability grows quietly.

**IMPACT** The scenario with the lowest detection signal, because it offers no clear trigger for counter-measures. Prices rise continuously by 5 to 12 percent per quarter, without any single quotation making headlines. Supply chains erode slowly: individual specialty grades disappear from the market, substitute purchases get more expensive, lead times creep from weeks to months. Companies that do not actively monitor only notice the deterioration once their inventory reserves melt away.

# Europe's countermeasures: what is happening and what is missing

Europe is reacting, but slowly and in a fragmented way. The three central initiatives sit at very different maturity levels:

 <b>ADOPTED</b> <span>● ● ●</span>	 <b>DESIGNATED</b> <span>● ● ●</span>	 <b>PILOT PHASE</b> <span>● ● ●</span>
<b>CRM Act + RESourceEU</b> <b>2024 / Dec 2025</b> <p>Defines 34 critical raw materials, of which 17 are strategic. The benchmarks of 10 % domestic mining, 40 % processing and 25 % recycling by 2030 refer to the 17 strategic materials. On 3 December 2025 the Commission adopted the RESourceEU Action Plan, designed to accelerate operational implementation for automotive, AI and defence.</p>	<b>CRM Act Strategic Projects</b> <b>from March 2025</b> <p>60 Strategic Projects designated under the CRM Act: 47 in the EU (March 2025) plus 13 in third countries (4 June 2025: Brazil, Canada, Greenland, Kazakhstan, Madagascar, Malawi, New Caledonia, Serbia, South Africa, Ukraine, UK, Zambia). A third tranche from the second call with more than 160 applications is currently being evaluated. Accelerated permitting paths, but construction phase and industrial ramp-up still to come.</p>	<b>European Raw Materials Alliance</b> <b>2028-2030</b> <p>Coordinates projects for rare earths and magnets. Pilot facilities in Sweden (LKAB), Norway (REEtec) and Germany (Vacuumschmelze, with the main NdFeB magnet expansion currently in Sumter, USA). Industrial scaling at the earliest 2028-2030.</p>

Operationally, a thin industrial base already exists in DACH: Wolfram Bergbau und Hütten Mittersill (Sandvik Group, Austria) as the only significant European tungsten asset, the Plansee Group in Reutte (Tyrol) as a tungsten and molybdenum processor, and Vacuumschmelze in Hanau as a European NdFeB magnet producer. The relevant reading on VAC: the new main capacity for NdFeB magnets is currently being built not in Hanau but in Sumter, South Carolina for General Motors (ramp-up end of 2025). European NdFeB manufacturing is therefore not being expanded, it is being partially relocated to the United States.

More tangible for DACH buyers are the established Western non-China players: Lynas (Australia, plant in Malaysia) is the largest NdPr producer outside China, MP Materials runs Mountain Pass as the only US rare-earth mine, Solvay is ramping up REE separation at La Rochelle, and Neo Performance Materials produces in Sillamäe, Estonia. Solvay and Neo are operationally more accessible for European mid-market buyers than an LKAB ramp-up in Sweden that will only reach industrial volumes in the 2030s.

In parallel, EU partnerships with Canada, Australia and Kazakhstan are under way, but new mines take 10 to 15 years from exploration to production, refineries even longer.



Between the EU's strategic targets and the operational needs of a mid-market machinery company sits a window of 5 to 10 years. In this phase, companies have to act on their own.

# What the mid-market can do now

The measures below are ordered by implementation horizon. The first three can be put in place within three to six months, while the last three require strategic decisions whose effect only becomes visible over a one- to three-year window.

## 01 Bill-of-materials audit on CRM exposure

Which products contain tungsten, rare earths or gallium? Many companies do not know their exposure because the critical materials are hidden in purchased parts and semi-finished goods. A systematic audit of the top 20 products identifies the biggest concentration risks within weeks.

## 02 Supplier mapping down to Tier 3

Where are the smelters and refineries? Critical dependencies rarely sit at the direct supplier, but two to three tiers deeper in the value chain. Without transparency down to the raw-material source, every risk assessment remains incomplete.

## 03 Rethink inventory strategy

Today many mid-market companies hold 2 to 6 weeks of safety stock for critical materials, while for tungsten, magnet and gallium inputs the appropriate level today is closer to 3 to 6 months. Just-in-time does not carry for materials with monopolistic supply structures, and the additional working-capital cost can be modelled cleanly per material and stoppage risk, whereas an unplanned production stoppage is neither budgetable nor operationally recoverable.

## 04 Evaluate substitution options

Pathways such as ferrite in place of neodymium, CBN in place of tungsten or SiC in place of GaN are technically feasible in principle, but each comes with its own performance and cost implications. A robust evaluation requires technical tests as well as customer approvals and should therefore be initiated now, while qualification can run without deadline pressure rather than under the stress of an already materialised licensing or supply bottleneck.

## 05 Establish geopolitical monitoring

China's export control policy is evolving dynamically. Companies that only learn about changes from the trade press react too late. Structured monitoring that picks up regulatory and geopolitical signals early creates a head start.

## 06 Prepare for EU CRM Act compliance

Reporting obligations, recycling quotas and domestic sourcing targets are coming. Companies that know and document their CRM exposure today will be compliant faster and avoid the rush when deadlines approach.

## Conclusion

The escalation has unfolded between August 2023 and January 2026 in six waves and can therefore no longer be filed as forecast but as inventory. The October wave of 9 October 2025 (Announcements 55, 56, 57, 58, 61 and 62) has been suspended under the Trump–Xi deal until 10 November 2026, while the five earlier waves and the tungsten centralisation from January 2026 continue to apply unchanged. The European countermeasures are under way, but their industrial scaling will only reach the volumes that the DACH machinery sector needs from 2030 at the earliest, leaving companies reliant on their own arrangements in the interim.

Companies that today know their CRM exposure, understand their supply chains down to the raw-material source and systematically evaluate substitution options secure operational room to manoeuvre in an environment where access to raw materials becomes a strategic variable.

The strength of the DACH mid-market lies in disciplined risk documentation and supplier transparency, maintained nowhere else at this level. Those who turn it on their CRM exposure now gain an edge over competitors who only illuminate their supply chains once licence applications start getting rejected.

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