



Critical Metal Supply Chains & Strategic Value for EuStrategix

Why Securing and Complying with High-Purity Critical Metals Is Mission-Critical for EU Industrial Resilience

Executive Summary

Lithium-ion battery (LIB) metals—such as lithium, nickel, cobalt, manganese, copper, and aluminium—are central to modern electrification, clean energy technologies, defence systems, and advanced electronics. Their supply chains are global, concentrated in a few regions, and vulnerable to geopolitical shifts, trade disruptions, and environmental regulations. Peer-reviewed research demonstrates that upstream mining and primary processing are highly concentrated by country and corporation, creating structural vulnerabilities for downstream users (Akhter, 2026). For European industry and security, securing reliable, compliant, and certified access to high-purity critical metals is therefore a strategic imperative.

This white paper explains the global landscape and articulates how EuStrategix Critical Metals (EUS) supports EU industrial resilience by enabling compliant sourcing and supply of these essential materials at the required quality levels.

1. Critical Metals in Strategic Technologies

Lithium-ion batteries and related systems are foundational to modern energy transition technologies. Metals such as lithium, cobalt, nickel, manganese, copper, and aluminium are indispensable for cathodes, anodes, current collectors, and electrical interconnects. According to Akhter (2026), these metals form tightly coupled global value chains in which disruptions at early stages can propagate rapidly downstream.

European targets for decarbonisation, electrification of transport, and industrial competitiveness depend on continuous access to these materials. Network-based analysis of lithium and copper value chains further confirms that supply interruptions can cascade across multiple industrial sectors, amplifying economic impact (Cortés Rufé et al., 2025).

2. Overview of the Global Supply Chain

2.1 Geographical Concentration

The extraction and processing of key LIB metals are heavily concentrated. Lithium is mined mainly in South America and Australia; cobalt is predominantly produced as a byproduct in the Democratic Republic of Congo; nickel and manganese production are concentrated in Australia, Indonesia, and South Africa; and copper mining occurs mainly in Chile, Peru, and the United States. Akhter (2026) demonstrates that this concentration is reinforced by corporate control over large shares of global output.

2.2 Downstream Processing and China's Dominance

Although mining is geographically diverse, refining and intermediate processing largely occur in China, which plays a dominant role in converting raw materials into battery-grade salts and precursor chemicals. This concentration adds systemic risk and geopolitical dependency, a vulnerability highlighted by both supply-chain mapping and network-based risk analysis (Akhter, 2026; Cortés Rufé et al., 2025).

2.3 Value-Chain Vulnerabilities

The supply chain from mine to refinery, precursor production, cathode and anode materials, and final cell manufacturing is long and fragile. Bottlenecks at any stage—caused by trade disputes, environmental constraints, or logistics disruptions—can ripple through the entire system and impact EU manufacturers.

3. The Need for High-Purity and Compliance

For advanced applications, especially in defence, aerospace, and high-performance electronics, material purity and specification tolerance are mission-critical. Trace impurities can reduce electrochemical performance, increase failure rates in high-stress environments, and compromise safety margins. As supply chains tighten, buyers increasingly demand verifiable purity and traceability to mitigate systemic risk (Cortés Rufé et al., 2025).

Furthermore, compliance frameworks such as the EU's REACH regulation mandate rigorous documentation and certification to ensure materials meet regulatory and safety standards. Non-compliant materials introduce legal, operational, and reputational exposure for EU industrial customers.

4. Strategic Supply: Risks and Mitigation

Supply-chain concentration creates geopolitical exposure, while environmental and regulatory pressures introduce uncertainty into project timelines and costs. In addition, price volatility driven by demand shifts and policy announcements adds financial risk. Academic research shows that these risks interact, producing non-linear effects across value chains (Cortés Rufé et al., 2025).

Mitigation strategies include diversifying sourcing, prioritising recycling and secondary supply, maintaining inventory buffers, and ensuring full traceability and regulatory compliance at every step.

5. EuStrategix's Value Proposition

EuStrategix Critical Metals (EUS) addresses the structural vulnerabilities identified in the academic literature by focusing on compliant, high-purity supply. EUS sources materials that are already REACH-certified, supplies ultra-high-purity products suitable for advanced applications, and delivers full regulatory documentation with each shipment. Through rigorous supplier vetting and traceability practices, EUS reduces exposure to systemic supply-chain risk.

6. Strategic Recommendations for European Industry

To strengthen EU industrial autonomy and resilience, stakeholders should invest in regional refining and recycling capacity, incentivise circular economy approaches, deploy advanced supply-chain analytics, and standardise material specifications to improve interchangeability and quality assurance.

7. Conclusion

The global supply chain for critical metals is complex, concentrated, and increasingly strategic. Peer-reviewed research confirms that structural concentration and network interdependence amplify risk across industries (Akhter, 2026; Cortés Rufé et al., 2025). For the European Union to remain competitive in electrification, advanced manufacturing, and defence technologies, reliable access to high-purity, compliant critical metals is essential.

EuStrategix Critical Metals stands ready to support this transition by offering secure sourcing, regulatory compliance, and quality assurance across its product portfolio.

References

Akhter, R. (2026). Mapping the Supply Chain of Lithium-Ion Battery Metals from Mine to Primary Processing by Country and Corporation. *Commodities*, 5(1), 2. MDPI.

Cortés Rufé, M., Yu, Y., & Martí Pidelaserra, J. (2025). Systemic Risk in the Lithium and Copper Value Chains: A Network-Based Analysis Using Euclidean Distance and Graph Theory. *Commodities*, 4(4), 23. MDPI.