

Sovereign Resilience in Critical Mineral Supply Chains

Overview:

Valerie Findlay from Pure Alchemi outlined strategies to strengthen the UK's critical mineral supply chain, such as, addressing vulnerabilities caused by reliance on China for mining, separating, and refining of rare earth elements. Legislative reform, technological innovation, and industry-government collaboration were highlighted as essential steps.

Key Insights

- **Supply Chain Vulnerabilities:** UK and Western nations depend heavily on China's near-monopoly on mining, processing, and refining due to decades of outsourcing upstream and midstream capabilities.
- **Policy & Legislative Recommendations:** Achieve sovereignty in CRM supply chain by adopting current best practices in policy/legislation (e.g. EU's CRMA, China's legislative support for Chinese companies re IP piracy). UK and Allies to coordinate industrial strategies by streamlining permitting, creating de minimis exempt government-backed financing & tax incentives, and amending the Basel Convention to reclassify "waste" as "CRM feedstock."
- **Technological Solutions:** Identify pre-existing technological solutions to sustainably recover CRMs from industrial waste (e.g. coal fly ash, bauxite residue, mine tailings), converting readily abundant hazardous legacy industrial waste into constituent elements.
- **Case Study – Pure Alchemi's "Project REEmine" (South Wales):** Demonstrates how legislative support with the right technology stack (i.e. vapour metallurgy, advanced combustion, and plasma-microwave) enables sovereign resilience in nine of the fifteen strategically important CRMs for defense.
- **Offtake Agreements & Financing:** Securing agreements and partnerships with defense primes and governmental entities is vital for financing and scalability.
- **Environmental & Sustainability Benefits:** Supports net-zero goals, remediates hazardous sites, and ensures traceability to prevent counterfeit materials.
- **Strategic Database Initiative:** Knowledge is key, catalogue UK's current and legacy industrial waste streams to identify which elements, and how much of these elements exist within UK borders to enable rapid response to current/future strategic material needs.
- **International Collaboration:** Engagements in EU, KSA, Ukraine, and Japan highlight global interest in alternative CRM sources. Opportunities exist for partnerships with primes to create a resilient CRM supply chain to support sovereign capabilities.

Call to Action

1. **Secure Offtake Agreements:** Pure Alchemi wishes to continue with, and begin, discussions with defense primes and government entities for aluminum, graphite, manganese, titanium, and rare earth elements (e.g. Pr, Nd, Tb, Dy, Y).
2. **Develop Waste Stream Database:** Universities, research and technology organisations, councils, and government departments to collaborate on a UK funded "knowledge project" on behalf of the UK to catalogue the UK's current and legacy industrial waste streams in order to inventory easily accessible metals within the UK's border.
3. **Arrange Site Visits:** Pure Alchemi invites stakeholders to Teesside to observe processing technology to build trust.
4. **Expand International Partnerships:** Share insights from Japan trade mission and strengthen ties with Rolls-Royce and other global primes.
5. **Engage Government on Stockpile Mechanism:** Advocate for a UK-managed stockpile to guarantee demand and support financing for large-scale processing facilities.