The Critical Mineral War - Urban Mining and the US-China Divide

Urban Mining –
The US Lag

The key issue: Who controls them?

China is far ahead;
the US is scrambling to catch up

Three key areas of focus:

- The booming market size
- The US's lag in urban mining
- China's dominance in battery recycling

The Current Landscape: China’s Dominance

China is the leading producer of 30 out of 44 critical minerals.

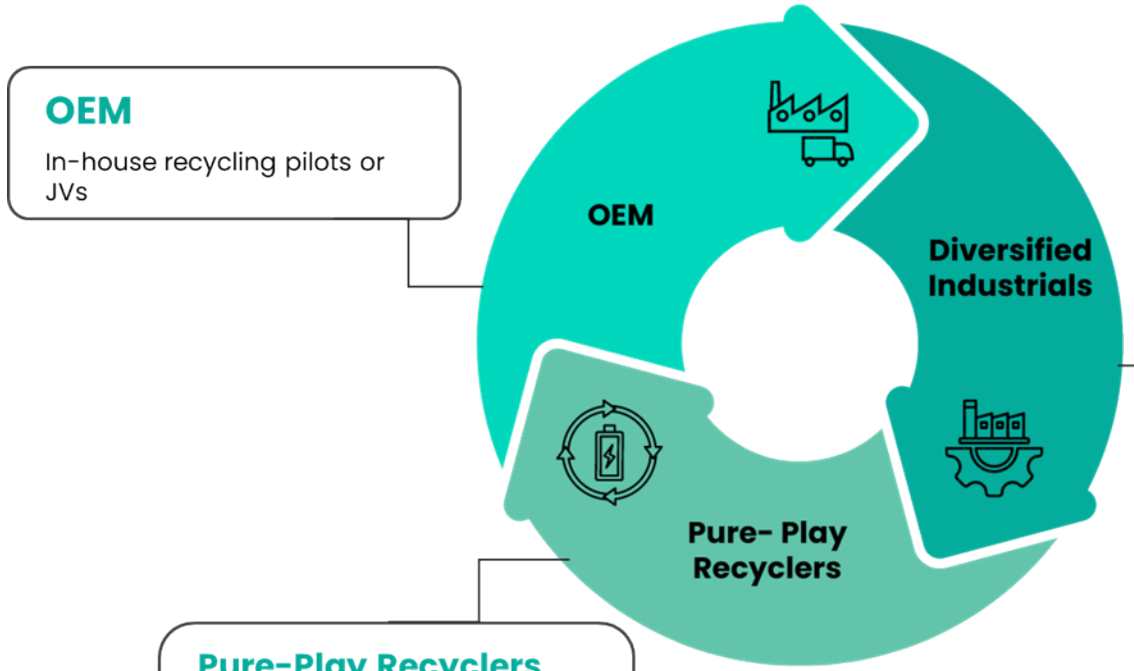
China refines 85-90% of the world's rare earth elements, 68% of its cobalt, 65% of its nickel, and 60% of its lithium. This isn't market share; it's market control.

China's Lead in Battery Development and Critical Minerals

- **China's Battery Dominance:** Controls over 75% of global lithium-ion battery production, led by CATL and BYD, driving EV and renewable energy markets.
- **Critical Minerals:** Refines ~80% of global lithium and 60% of copper, key for battery components.
- **Supply Chain Control:** Secures foreign mining rights (Africa, South America), creating a vertically integrated ecosystem, per *The War Below*.
- **Strategic Advantage:** State-backed investments and full value chain control reduce costs and vulnerabilities, enabling potential disruptions to Western EV production.
- **Tech Leadership:** Leads in solid-state and sodium-ion battery R&D, with 2-3x higher investments than the West, setting global standards.

Market Size: A Booming Opportunity

How the Battery Recycling Supply Chain Works



OEM

In-house recycling pilots or JVs

Diversified Industrials

Diversified conglomerates with battery recycling as a business unit

Pure-Play Recyclers

Recyclers managing end-to-end supply chain from collection to metal salt production

Market Size: A Booming Opportunity

2022 trade in energy-related critical minerals: $378 billion

Battery sector drives demand (70% of global cobalt consumption).

US is not positioned to capitalize due to:

- Thin supply chains
- Import dependence
- Geopolitical vulnerabilities

What is Urban Mining?

- Extracting critical minerals from waste.
- Hydrometallurgy at my company recovers critical minerals from black mass.

US Challenges:

- Underdeveloped infrastructure
- Limited recycling capacity
- Most black mass exported to Asia for processing
- Government and market focused on the wrong sectors such as mining without closing the loop

US Focus on the Front End:

Risks of Ignoring the Tail End

- **US Mining Strategy Flaw:** Focus on extraction (e.g., Inflation Reduction Act) neglects recycling and refining, exporting black mass to China.
- **China's Recycling Dominance:** Refines >90% of US black mass, capturing economic benefits, per The War Below.
- **Environmental Pushback:** US mining faces opposition (e.g., Nevada lithium projects), while China leverages overseas operations.
- **Recycling Gap:** China controls 70% of global battery recycling; US exports most black mass, risking China's control of refined outputs by 2030.
- **Implication:** Overemphasis on mining increases environmental costs, misses recycling opportunities, and undermines EV/grid storage security.

China's Lead in Battery Recycling

- **Largest facilities** with massive scale and efficiency.
- **Closed-loop system** - spends less on imports.
- **Controls** mining and recycling supply chains.
- **US is playing catch-up** with only a handful of startups.

US Focus on the Front End:

Risks of Ignoring the Tail End

- **Shift to Circular Economy:** US must prioritize urban mining and recycling over mining-centric focus to reduce reliance on China.
- **Core Strategy:** Invest in domestic black mass processing to supply 20-30% of critical minerals by 2035, per sector analyses.
- **Insights from The War Below:** China's closed-loop model integrates mined/recycled materials; US can leverage advanced hydrometallurgy to compete, avoiding mining conflicts.
- **US Example:** Atoka, Oklahoma facility processes black mass into 99% pure cathode material, strengthening domestic supply chains and jobs.
- **Benefits:** Cuts reliance on Chinese lithium/cobalt by 40-50%, boosts EV battery production, reduces environmental impact.
- **Recommendations:** Offer tax credits, foster public-private partnerships, and invest in R&D for sustainable recycling.

The Path Forward

Invest in urban mining infrastructure.

- Fund hydrometallurgy-based recycling facilities in the US.
- Expand **Inflation Reduction Act** support.

Foster innovation.

- Industry, government, and academic partnerships for R&D.

Act with urgency.

- Every year of inaction **deepens reliance on China**.

Conclusion

Critical minerals are essential for the US’s future.

China has a lead, but it’s not too late to catch up.

Urban mining and battery recycling are imperative.

Collaboration between industry and government is necessary.

Secure US supply chains and build a sustainable future.

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