

Critical Raw Materials for Defence Online Snack

Fewer Mines more Megawatts: Strengthening the UK Battery Supply Chain

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Presenters and panel:

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1. Context

This session provided an in-depth overview of the UK's lithium-ion battery recycling landscape, highlighting national capability gaps, technological innovation, policy pressures, and opportunities for defence-aligned circularity. The discussion brought together experts from the Faraday Intuition-funded ReLiB Project, emerging industry providers, defence stakeholders, and policy influencers to explore the technical, regulatory, and strategic challenges facing the UK's battery ecosystem.

2. Key Discussion Points

UK Recycling Capacity & Challenges

- The UK lacks large-scale facilities for lithium-ion battery recycling; most black mass is exported to Asia due to high permitting and hazardous waste requirements.
- Low volumes of end-of-life batteries and strict waste classifications impact economics.

Technical Barriers

- Complex, lack of standardisation and adhesive-heavy pack designs increase disassembly cost and risk.
- High variability across OEMs limits automation potential.

Technological Innovations

- Emerging UK companies (Altilium, Cellcycle, ICoNiChem) are developing hydrometallurgical processes, though at low capacity.
- Leicester's oil-water separation direct-recycling method offers major economic and environmental benefits.

Reuse & Modular Defence Applications

- Reuse is promising for domestic and defence energy storage but constrained by safety, liability, and monitoring challenges.
- Modular, serviceable battery systems are valuable for defence flexibility, reconfiguration, and cell-level diagnostics.

Strategic UK Manufacturing Considerations

- High energy prices and regulatory complexity hinder UK gigafactory development/investment.
- Sovereign capability must be balanced with overseas partnerships; government procurement support could anchor domestic investment.

Policy, Collaboration & Roadmapping

- Cross-sector collaboration is essential: defence must articulate needs early into innovation pipelines.
- EU/UK recycling targets are challenging due to low waste volumes; policy influence is key.

3. Insights

1. **The UK faces strategic risk from limited domestic recycling capacity**, with reliance on Asian manufacturing and waste processing creating vulnerabilities for defence and industry.
2. **Emerging direct recycling technologies could shift the economics**, offering significantly higher processing economy (est. £6,000/ton) vs. traditional hydrometallurgy (est. £300/ton).
3. **Design for reuse and recycling is critical**, and future battery formats must prioritise design for disassembly, use of debondable adhesives, and modularity—especially for defence logistics.
4. **Defence applications require more robust, reconfigurable architectures**, aligning with modular, software-defined battery concepts and adaptable duty cycles.
5. **Government intervention and subsidies are key** to establish sovereign manufacturing and recycling capacity due to high UK energy costs and permitting constraints.
6. **Cross-sector collaboration and policy alignment are essential** to meet future regulatory requirements and build a resilient UK battery supply capability.

4. Strategic Actions

A. Defence–Relib Collaboration

Coordinate with the battery committee and OEMs to articulate defence-specific use cases and requirements to the Relib project for future technical integration.

B. Input to MOD Battery Strategy

Provide meeting insights—including the need for a UK gigafactory, circularity infrastructure, and procurement levers—to inform MOD’s upcoming battery strategy.