

# **Critical Raw Materials for Defence Online Snack**

## **Fewer Mines more Megawatts: Strengthening the UK Battery Supply Chain**

Tuesday, 27 January 2026

Presenters and panel:

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- Prof Andy Abbot, University of Leicester Centre for Sustainable Materials Processing
- Dr Gavin Harper, Birmingham Centre for Strategic Elements and Critical Materials

### **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 Institution-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.

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### **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.

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## 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, 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.
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## **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.