THE BATTERY CHRONICLES

STREAMS
SUSTAINABLE TECHNOLOGIES FOR REDUCING EUROPE'S BATTERY RAW MATERIALS DEPENDANCE

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Behind Battery Recycling: Reaching Circularity with AETC's Direct Recycling Technology

I am a materials engineer at American Energy Technologies Company (AETC) located in Wheeling, Illinois, USA. As a materials engineer with a focus on renewable energy systems, I have worked closely on projects with the STREAMS and SAFELOOP consortiums. In my role as a materials engineer, I have overseen the recycling of spent lithium-ion batteries and collected data for life cycle assessments of AETC's battery recycling processes.

STREAMS is a consortium comprised of 19 partners from 13 countries, with each partner contributing uniquely to the value chain of the project. At AETC, we have beneficiated graphite for use by STREAMS partners, and we initiate battery recycling projects to meet the goals of STREAMS. The impact of the battery recycling done through the STREAMS project is incredibly significant, as STREAMS aims to advance sustainable battery technologies to bolster Europe's resilience in the battery market. STREAMS does this by strengthening the domestic supply chain of battery materials in order to decrease dependence on imported materials.

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Here at AETC, we possess expertise in the critical mineral extraction from end-of-life lithium-ion batteries, evidenced by our Direct Recycling technology. In March of 2026, AETC conducted its most recent run of this Direct Recycling Technology, extracting critical materials from over 2500 cells. Through this process, AETC recovers cathode materials, anode materials, separators, steel casings, copper, and aluminum, among others. Up to 97% of spent battery components are recovered and recycled with our Direct Recycling Technology. I have managed the processing of recovered anode from this recycling process. Recovered graphite undergoes thorough processing including calcination, thermal purification, and spheroidization before it is ready for use in future products. AETC processes this graphite on an industrial scale, exemplifying the viability of our processes at high volume.

As a part of our work on the STREAMS project, AETC prioritizes environmentally responsible design, participating in Harmonized Life Cycle Sustainability and circularity assessments conducted by our partners in the consortium. To increase circularity and sustainability, AETC aims to find uses and markets for all components of spent lithium-ion batteries, beyond critical anode and cathode materials. Additionally, AETC makes adjustments to the Direct Recycling process based on the results of circularity assessments conducted as a part of STREAMS. In my work on these life cycle assessments, I have collected and provided data to assist in modeling the impact of various modifications to our process.

In the absence of battery recycling many critical minerals go to waste and battery manufacturers are left reliant on diminishing supplies of critical resources. Battery recycling reduces the industry's reliance on mining my taking advantage of the critical resources readily available in used batteries. The battery recycling work done at AETC is not possible without contributions from our partners in the consortium. The work done through STREAMS is incredibly collaborative and battery recycling initiatives rely on the unique knowledge and capabilities possessed by each of our partners. This collaboration and innovation bring us towards our goal of enhancing Europe's competitiveness in the global battery industry to support a sustainable and socially responsible path forward.

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