

Circular Economy Solutions Dialogues (CESD)

Circularity in batteries: design, recycling and second-life

Online session | Tuesday, 18 November 2025 | 13:30–14:30 CEST

Brief note (*internal - for CESD participants*)

The session was attended by approximately 25 participants bringing together Circular Economy stakeholders to discuss how technical, financial, and regulatory innovations can enable circular battery value chains, particularly in contexts where market growth is rapid but supporting infrastructure and governance are still emerging.

The discussion focused on three objectives:

- Examining practical solutions that support circularity across the battery life cycle (design, reuse/repurposing, end-of-life).
- Discussing financial and policy instruments that can de-risk investment in recycling and second-life systems.
- Enabling cross-sector exchange on barriers and enabling conditions, with particular attention to developing and emerging economies.

Key points from the discussion

Recycling alone does not guarantee circularity or safety

A core message was that “recycling at scale” can still create severe impacts when it is not properly regulated or enforced. In contexts with widespread informal practices, high battery turnover can lead to large volumes being processed in ways that generate significant pollution and public health risks. The discussion underscored that circularity depends as much on safe processing and governance as on material recovery rates.

Transition strategies should prioritise life extension where recycling infrastructure is missing

The discussion emphasised that many countries lack lithium-ion recycling capacity and face constraints on exporting used batteries. In such conditions, an effective transition pathway may be to reduce waste generation by extending battery life and postponing end-of-life pressure, creating time for infrastructure and policy to mature.

Battery-as-a-service can unlock adoption and enable controlled lifecycle management

Affordability was highlighted as a key barrier to shifting from low-cost, short-lifespan batteries to longer-lasting alternatives. A service-based approach where users do not own the battery and instead pay per use was presented as a practical mechanism to:

- lower upfront costs,
- support faster uptake, and

- keep batteries under managed ownership, improving decisions on repair, second-life use, and end-of-life handling.

Second-life applications are viable when matched to appropriate use cases

Second-life batteries were framed as a near-term circular option where degraded capacity is still sufficient for less demanding applications. Agriculture electrification was discussed as an example, including retrofitting existing diesel-powered equipment and using batteries in settings where operations are localised and swapping is feasible. This approach was highlighted as a solution that reduces diesel dependence while extracting additional value from battery assets.

Traceability and data are foundational to both safety and circularity

Participants stressed that second-life and end-of-life decisions require reliable battery health information (e.g., cycle counts, remaining capacity, safety status). Without traceability, second-life markets risk misinformation, unsafe use, and loss of trust. A broader conclusion was that battery passport-type approaches and digital monitoring should evolve toward interoperable, global solutions rather than remaining limited to a few jurisdictions.

Key barriers are financial, regulatory, and institutional

The discussion highlighted recurring obstacles such as, insufficient early-stage funding for innovative circular models, policy and enforcement lag behind fast-growing markets, safety and quality risks from weak regulation, and limited mechanisms to support developing-country innovators during scaling.

Takeaways and suggested follow-up areas

- Circularity requires safe and regulated systems, not only recycling targets.
- Where recycling infrastructure is absent, progress may come from life extension, service models, and second-life.
- Scaling circular solutions require de-risking finance, stronger governance, and traceability standards that work across borders.
- Identify and compare financing instruments that enable circular battery systems in emerging markets (grants, blended finance, guarantees).
- Define minimum traceability requirements (data fields, safety indicators) suitable for global value chains.
- Explore policy mixes that jointly address safety, enforcement, and development of domestic/regional recycling capacity.