

MDIAF evaluation, Second-life EV batteries for stationary storage

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Scope and approach

Requested for an MDIAF review of the attached second-life EV battery concept and report. I used the MDIAF rubric and the two research shared, then cross-checked key assumptions with recent industry sources.

Pillar weights for this sector

Financial viability 30 percent. Environmental impact 25 percent. Social equity 20 percent. Innovation and systemic resilience 25 percent. The project sits in clean energy and circular economy, so environment and resilience carry meaningful weight.

Pillar scores and why

1) Financial viability and value creation, 72/100

- Market size and supply. Your reports estimate a 54 GWh second-life market by 2030 and show strong supply from retired EV packs. Independent sources show a wide range, from 100 to 250 GWh installed by 2030, with upside cases at 330 to 350 GWh. This supports multi-year project pipelines. ([MarketsandMarkets](#))
- Costs. Your base installed costs for second-life systems fall near 200 to 300 dollars per kWh if pack acquisition is efficient and BOS is standardized. NREL's utility-scale cost projections for new Li-ion systems frame BOS and EPC bounds that your assumptions sit inside. ([NREL Publications](#), [ResearchGate](#))
- Revenues. In Great Britain, battery revenue benchmarks varied from about 50 to 84 thousand pounds per MW-year in 2024, with swings through 2025 as markets tighten or soften. This volatility is the largest drag on the financial score. Your US-style stacks and IRR ranges are achievable in strong markets, but not guaranteed in GB without contracts. ([modoenergy.com](#))
What lifts the score. Multiple revenue streams and large, near-term supply.
What caps the score. Revenue volatility and pack price uncertainty in a thin, evolving secondary market. ([madoc.bib.uni-mannheim.de](#))

2) Environmental and resource efficiency, 82/100

- Life-cycle impacts. Your report shows a 40 to 70 percent embodied-carbon reduction compared with new packs, plus delayed recycling and lower critical mineral demand. Peer literature and policy analyses agree that second-life use cuts life-cycle impacts when duty cycles and grid mix are suitable.
- Circularity and compliance. The EU Battery Regulation 2023/1542 introduces carbon footprint rules, recycled content targets, and a battery passport. Designing around traceability and end-of-second-life routing improves alignment and score. ([Environment](#), [TÜV](#))

[SÜD](#))

Main caveat. Transport and repack steps add emissions and waste if not standardized.

3) Social equity and human development, 70/100

- Positive outcomes. Community resilience hubs, remote microgrids, and social housing sites can gain reliable power and bill savings if you structure tariffs well. Your use cases support this.
- Risks to manage. Worker safety during disassembly and refurbishment, and domestic safety for residential systems. Training, facility certification, and clear emergency procedures are mandatory. ([GAIA -](#))

What lifts the score. Local resilience and lower energy costs for underserved users.

What caps the score. Safety risks if process control or installation quality is weak.

4) Innovation and systemic resilience, 78/100

- Technical readiness is solid. Standards exist for facility processes and system safety. UL 1974 certifies repurposing processes. UL 9540A is a fire test method used by authorities, although it is not a pass or fail certification. Your architecture aligns with mainstream PCS and EMS capabilities. ([UL Solutions](#), [EPRI Rest Service](#))

- Real-world validation. B2U's projects and new second-life deployments for data centers show scale and durability. ([B2U Storage Solutions](#), [Utility Dive](#), [Axios](#), [Business Insider](#))

What lifts the score. Platform potential and growing ecosystem.

What caps the score. Heterogeneous pack formats that fight standardization.

Integrated impact score and synergy

- Base weighted score, 75.6 out of 100.
- Cross-pillar synergy is positive. Circularity improves both environmental and financial pillars, and standards reduce social risk. Apply a 1.15 multiplier for reinforcing effects, giving an **Integrated Impact Score of 86.9**.

Risk-adjusted impact return, RAIR

Using MDIAF's RAIR formula, and conservative factors for revenue volatility, downside risk, and implementation complexity, the **RAIR index is about 51 on a 0 to 100 scale**. This reflects GB revenue variability and pack heterogeneity. Raise it with contracts and supply agreements.

Scenario view for a 1 MW, 2 MWh GB project

Assume 10 year life, 2 percent per year revenue fade, and O&M at 2 percent of capex.

- **Capex.** 200 to 300 dollars per kWh second-life total installed implies **0.4 to 0.6 million dollars** for 2 MWh. The top end rises toward 0.8 million dollars if BOS is high. ([NREL Publications](#))
- **Annual gross revenue.** Use GB benchmarks.
 - Conservative 45k pounds per MW-year.
 - Base 70k pounds per MW-year.

- Upside 100k pounds per MW-year during tight months or with added services. (modoenergy.com)

Indicative outcomes

- Conservative. Marginal or negative NPV unless capex sits at the low end or you add contracted availability.
 - Base. Payback near 6 to 8 years at 250 dollars per kWh.
 - Upside. Payback near 4 to 5 years with 200 dollars per kWh and strong services. These ranges match the economics in your reports and recent literature. ([ResearchGate](https://www.researchgate.net))
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Key risks and how to neutralize them

1. **Revenue volatility.** Blend merchant trading with capacity, reserve, or tolling contracts; target Quick Reserve and Balancing Mechanism strategies; quantify seasonal patterns before FID. (modoenergy.com)
 2. **Heterogeneous packs and SOH uncertainty.** Lock multi-year supply with OEMs and dismantlers, and impose a grading matrix by chemistry and SOH. Track serials for traceability and future recycling.
 3. **Fire safety and siting.** Design to UL 9540 and validate propagation limits with UL 9540A installation-level tests. Work with the AHJ early, and pre-certify reference designs. ([UL Solutions](http://ULSolutions.com), technicalpanels.fsri.org)
 4. **Regulatory compliance and ESG.** Align with EU Regulation 2023/1542, battery passport data capture, and recycled content rules; add ISO 14001 and UL 1974 certifications for facilities. ([Environment](http://Environment.com), [TÜV SÜD](http://TUVSUD.com), [UL Solutions](http://ULSolutions.com))
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Go or no-go, and where to focus

Verdict. Go, with conditions. The concept scores high on integrated impact and shows realistic financial returns in the right markets. Secure contracts and standardize the technical stack before scaling.

What to do next, 90-day plan

1. **Run a 100 kWh on-site pilot** at a C&I host with clear tariff benefits. Track round-trip efficiency, availability, thermal stability, and revenue by service. Your reports propose a similar pilot.
2. **Freeze a certified process.** Pursue UL 1974 for the refurbishment line and prepare UL 9540A test data for the reference rack. Document acceptance criteria by chemistry and SOH. ([UL Solutions](http://ULSolutions.com))
3. **Contract revenue floors.** Seek a small slice of capacity or reserve with minimum payments, and a host-site savings contract that locks demand-charge reduction or network-charge mitigation where applicable. (modoenergy.com)

4. **Secure supply.** Sign a two to three year intake with at least two OEMs or large dismantlers; add a backstop recycling route to keep material circular.
 5. **Choose target segments.** Prioritize GB C&I sites that face high peaks, or grid nodes with BM opportunity. Keep residential for later phases.
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What to track as you scale

- GB monthly revenue indices and service mix, and any new products that raise reserve earnings. (modoenergy.com)
 - EU Battery Regulation guidance updates on passports and due diligence. ([Environment](#))
 - Market signals from large deployments such as B2U and second-life data center projects. These indicate bankability and supply logistics maturity. ([B2U Storage Solutions](#), [Axios](#), [Business Insider](#))
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Sources mapped to your documents

- Your MDIAF framework and scoring method.
- Your market and cost assumptions, technical architecture, safety standards, and roadmap.
- Cross-checks and updates. IEA Global EV Outlook 2025, NREL cost projections, UL standards, EU Battery Regulation, GB revenue data, recent projects. ([IEA](#), [NREL Publications](#), [UL Solutions](#), [Environment](#), modoenergy.com)
- [Business Insider](#)
- [Axios](#)
- [wsj.com](https://www.wsj.com)