REBATTEX Policy Paper No. 2

From Waste to Value:

Building Europe's Market Infrastructure for Second-Life EV Batteries

Executive Summary

Europe has created one of the world's most ambitious policy frameworks for batteries. The EU Batteries Regulation, the Critical Raw Materials Act, circular economy policy and new vehicle end-of-life rules all seek to increase resource efficiency, improve traceability, strengthen European resilience and keep valuable materials in productive use for longer. Yet regulation alone does not create functioning markets.

As electric mobility expands, Europe will face a rapidly growing volume of EV batteries leaving their first automotive use. Many of these batteries will not be technically exhausted. Batteries may be removed because a vehicle has been damaged, dismantled or written off, or because a battery no longer meets the requirements of its original application while retaining substantial remaining capacity.

Research by the European Commission's Joint Research Centre has previously noted that automotive batteries can retain around 70–80% of their original capacity when removed from vehicle use, although actual condition varies considerably and must be assessed battery by battery.

These batteries can potentially support vehicle repair, refurbishment, remanufacturing, repurposing and stationary energy storage before their materials are ultimately recovered through recycling.

The problem is that Europe still lacks a sufficiently developed market infrastructure to make such transactions routine.

Battery owners and prospective buyers face fragmented diagnostics, inconsistent terminology, uncertain valuation, complex logistics, regulatory uncertainty, unclear allocation of responsibilities and limited cross-border market transparency. As a result, technically valuable batteries can become difficult to transact, even when there is a potential buyer and a technically viable next use.

Europe therefore faces a "missing middle" between battery manufacturing and battery recycling: the commercial infrastructure required to identify, assess, value, trade and document batteries that can remain in productive use.

This matters at scale. Rebattex estimates that, by 2035, around 180 GWh of battery capacity could become accessible from accident-damaged, dismantled and retired electric vehicles across Europe. The figure is intended as an order-of-magnitude estimate rather than an official EU forecast and should be read alongside the substantial uncertainty surrounding future EV fleets, battery sizes, vehicle lifetimes, accident rates and residual battery condition. At a notional annual cell production capacity of approximately 40–50 GWh per large European gigafactory, 180 GWh corresponds to roughly four gigafactories' annual output.

The strategic question is therefore not only how Europe will recycle batteries. It is also how Europe will ensure that batteries which still have useful technical and economic life can reach their highest-value lawful next use before recycling.

This paper proposes eight priorities:

1. improve regulatory clarity regarding battery status and responsibility;
2. harmonise battery diagnostics and State-of-Health assessment;
3. establish common battery identity and data standards;
4. improve transparency and methodologies for residual-value assessment;
5. enable interoperable digital transaction and traceability infrastructure;
6. clarify responsibility and liability across second-life transactions;
7. facilitate compliant cross-border trade in reusable batteries; and
8. recognise market infrastructure as a strategic enabler of European battery circularity.

Europe has invested heavily in battery production and recycling. The next step is to build the market mechanisms that connect the two.

1. Europe Has Built the Rules. Now It Needs the Market.

The European Union has made battery circularity a strategic industrial and environmental priority. The Batteries Regulation establishes requirements covering the battery lifecycle, including sustainability, traceability, producer responsibility and the treatment of waste batteries. The Critical Raw Materials Act reflects Europe's growing concern about access to strategically important materials, while circular economy policy increasingly emphasises extending product lifetimes, reuse and resource efficiency.

The direction of travel is clear: batteries and the critical materials contained within them should remain in productive use for as long as this is technically, economically and environmentally justified.

The Commission has also recognised second-life applications for EV batteries for several years. Earlier impact-assessment work accompanying the Batteries Regulation considered increasing volumes of batteries becoming available for second-life applications and warned that divergent national approaches could distort the internal market.

More recent European research reaches similar conclusions. CEPS work published in 2026 identifies effective implementation of the Batteries Regulation, financial support and greater harmonisation of standards as important enabling conditions for scaling circularity applications for EV batteries. It also highlights the need for clearer liability frameworks and harmonised State-of-Health approaches.

The challenge, therefore, is increasingly less about recognising the value of circularity and more about making it work commercially. Europe has functioning markets for newly manufactured batteries. It is also building significant recycling capacity.

Between those two points, however, lies a much less developed ecosystem.

2. The Missing Middle of the Battery Economy

A battery leaving an electric vehicle does not automatically have only one possible destination. Depending on its condition, legal status and intended use, it may be suitable for reuse in another vehicle, refurbishment, remanufacturing, repurposing into a different application or, when further use is no longer appropriate, recycling.

This intermediate part of the lifecycle can be described as Europe's "missing middle". The original Rebattex white paper identified this gap between manufacturing and recycling as including repair, reuse, remanufacturing and repurposing. The difficulty is not simply technological. It is transactional.

A dismantler may have a technically sound battery but lack reliable information about demand elsewhere in Europe. A repair workshop may need a replacement battery but have limited means of assessing available units. An energy-storage company may be interested in second-life capacity but need credible information regarding battery history, configuration, State of Health and safety. An insurer may want to understand whether a battery removed after an accident has a residual economic value. A logistics provider needs the information required to transport the battery lawfully and safely.

Each participant sees one part of the lifecycle. A functioning circular market requires those parts to connect. Today, they often do not.

3. Why Technically Valuable Batteries Can Become Economically Stranded

An EV battery may retain substantial technical value while still being difficult to sell. This apparent contradiction is caused by market friction.

Buyers may need to understand:

- which battery is being offered and its exact configuration;
- its provenance and ownership history;
- its State of Health and technical condition;
- whether it has been damaged;
- whether compatible diagnostic information is available;
- what use it is suitable for;
- what regulatory requirements apply;

- what transport and packaging requirements apply;
- what responsibility the buyer assumes;
- what the producer or importer supports as a second-life;
- and what the battery is worth.

Sellers face the opposite challenge. They need credible buyers, reliable information about demand and an economically rational way to determine whether reuse, repair, repurposing or recycling offers the best outcome. Today's sellers and buyers are trying to trade the most complex part of the car, in systems built for simple parts.

These problems are compounded by fragmented data and technical systems. The Rebattex policy paper notes that diagnostic connectors, software and hardware differ between vehicle models and OEMs, making consistent battery assessment difficult for dismantlers and workshops.

Recent European research similarly identifies standardisation, State of Health and liability as important barriers to second-life applications. The consequence is important: technical value does not automatically become market value.

Without trusted mechanisms for assessing and transacting batteries, an asset with years of potential productive life may remain in storage, be restricted to a local market or move prematurely toward recycling.

4. Europe's Emerging Battery Reserve

The scale of this issue will increase rapidly as Europe's EV fleet matures.

European institutions have long anticipated substantial growth in the number of batteries leaving automotive use. Earlier European Parliament material cited estimates that industrial batteries, dominated by EV batteries, could grow from around 0.7 million tonnes to almost 4.4 million tonnes by 2035.

Research has also estimated millions of EV batteries reaching end of life annually during the 2030s, although projections vary significantly depending on assumptions about vehicle sales, battery life and retirement.

Rebattex has used these broader market dynamics to develop an indicative estimate of the battery capacity that could become accessible from damaged, dismantled and retired European EVs. Our current estimate is that approximately 180 GWh of battery capacity could potentially become available by 2035.

This number should not be interpreted as meaning that 180 GWh will automatically be suitable for second-life applications. Some batteries will be damaged. Some will have insufficient residual performance. Some will be most appropriately recycled. Others may remain in automotive use for longer than expected.

The purpose of the estimate is instead to illustrate the potential scale of the resource entering decision points between continued automotive use and recycling.

For comparison, current European industrial policy measures discuss cell-manufacturing capacity in hundreds of GWh per year. European Commission analysis published in 2026 projected EU battery-cell capacity of 379 GWh in 2027 and 504 GWh in 2028 based on announced projects.

Using a simplified benchmark of roughly 40–50 GWh annual output for a large battery gigafactory, 180 GWh represents approximately four gigafactories' annual production. The analogy is deliberately illustrative. The more important point is that Europe is gradually accumulating a substantial reserve of already-manufactured battery capacity embedded in vehicles.

A significant share of the critical raw materials, energy and capital required to manufacture those batteries has already been invested. The circular economy challenge is therefore to determine how much of that embedded value can remain productive before recycling becomes the appropriate final step.

5. Battery Passports Are Necessary, but Not Sufficient

Improved battery information is an important part of the solution. The EU Battery Passport should materially improve access to information and traceability over time. But information alone does not create a market.

A digital battery record cannot, by itself, find a buyer, establish a market price, determine whether a particular battery is suitable for a specific application, arrange compliant logistics, allocate contractual responsibility or complete a transaction.

The white paper summarised this distinction clearly: the Battery Passport can improve transparency and documentation, but it does not itself create buyers and sellers, determine price, allocate liability or execute transactions.

The distinction is important.

Europe needs battery information infrastructure, but it also needs battery market infrastructure. The two should be complementary.

Battery Passport data can provide a trusted information layer. Market infrastructure can use that information, together with diagnostics, commercial data and regulatory workflows, to help market participants determine what should happen to a battery next.

6. What Market Infrastructure Needs to Provide

A scalable European second-life battery market requires more than a digital listing service. Several capabilities need to work together.

Battery identity

Every battery needs to be reliably identified and connected to the relevant technical and lifecycle information.

Diagnostics

Market participants require credible information regarding State of Health, damage, performance and suitability for intended applications.

This will require greater standardisation and better access to diagnostic information across manufacturers and models.

Valuation

Second-life batteries currently lack mature and transparent valuation mechanisms.

Condition, chemistry, configuration, application, remaining life, location and regulatory status can all affect value. Better market data can gradually enable more robust valuation methodologies.

Regulatory documentation

Transactions need to reflect the battery's actual legal status and the obligations applying to the relevant economic operators.

Digital workflows can help participants gather and exchange the documentation needed to support compliant transactions without replacing the responsibility of each party to comply with applicable law.

Traceability

Ownership, condition, movement and significant lifecycle events should be capable of being documented over time.

Trusted counterparties and transactions

Market participants need mechanisms for verifying counterparties, establishing contractual terms, documenting transactions and reducing commercial risk.

OEM or Importer approval

The producer of the vehicle may want to have a say in what the battery should be reused for, or if it should be sent straight to recycling if reuse isn’t feasible for any reason.

Different vehicle designs such as cell-to-module, cell-to-pack or pack-to-chassis, offer different opportunities.

Logistics and chain of custody

High-voltage batteries are not ordinary parcels. Their movement involve dangerous-goods requirements and, where batteries are legally classified as waste, additional waste-management and shipment requirements.

Market infrastructure must therefore connect commercial transactions to compliant physical movement.

Taken together, these functions can convert fragmented battery availability into a more transparent and accessible European market.

7. Why This Matters Beyond the Battery Industry

Creating a functioning second-life battery market is not only an environmental objective. It has implications for European industrial competitiveness.

- For insurers, improved residual-value markets can affect the economics of EV claims and reduce unnecessary loss of valuable components.
- For repair workshops, greater access to tested replacement batteries can improve the economic feasibility of EV repair.
- For dismantlers, batteries can become higher-value recoverable assets rather than difficult inventory.
- For energy-storage companies, a deeper market can expand access to alternative battery supply.
- For vehicle manufacturers and fleets, transparent second-life markets can improve understanding of residual battery value and ultimately EV-affordability and better TCO's.
- For Europe as a whole, extending productive battery life can help preserve economic value and keep critical materials in use before they are eventually recycled.

That does not mean reuse should always take precedence over recycling. The appropriate pathway depends on battery condition, safety, technical performance, economics, environmental impact and applicable law.

The objective should instead be to ensure that recycling occurs when recycling is the appropriate next step, rather than because functioning alternatives are unavailable or too difficult to transact.

8. Policy Priorities for a Functioning European Second-Life Battery Market

Europe has already established much of the regulatory foundation. The next phase should focus on enabling implementation and market formation.

1. Improve clarity and consistency around battery status

Market participants need greater predictability regarding when batteries are products, when they are waste and what evidence is required when batteries move toward reuse, repurposing or other second-life pathways. Greater consistency between Member States would reduce uncertainty and support the internal market.

2. Develop common approaches to diagnostics and State of Health

Europe should accelerate standardisation of battery diagnostics and State-of-Health methodologies. A buyer in one Member State should be able to interpret battery-condition information produced in another with reasonable confidence.

This priority is consistent with recent CEPS recommendations for harmonised approaches to State of Health and State of Charge.

3. Improve access to battery data and interoperability

Battery data needs to be usable across OEMs, dismantlers, repairers, insurers, battery specialists and energy-storage providers. Battery Passport infrastructure should support interoperable commercial use rather than becoming another isolated data repository.

4. Develop transparent residual-value methodologies

Industry and policymakers should support greater transparency around battery valuation. More consistent diagnostics and transactional data can gradually create the evidence base required for credible residual-value models.

5. Support trusted digital transaction infrastructure

The EU should recognise that traceability and compliance information need to connect with real commercial transactions. Digital infrastructure capable of combining identity, diagnostics, documentation, counterparties and transaction records can reduce the cost and risk of participating in circular battery markets.

6. Clarify responsibility and liability

Second-life markets will struggle to scale while market participants remain uncertain about responsibility for testing, compliance, product safety and producer obligations. Clearer allocation of legal roles is particularly important when a battery changes owner, application or jurisdiction.

7. Facilitate compliant cross-border transactions

A European circular battery market should be European in practice, not merely in principle. National fragmentation limits liquidity and can leave sellers and buyers unable to find one another.

Digital documentation, common standards and clearer regulatory pathways can help make lawful cross-border trade easier without lowering environmental or safety safeguards.

8. Recognise market infrastructure as part of circular industrial policy

European policy has rightly supported battery manufacturing, research and recycling. Market infrastructure enabling reuse, repair, remanufacturing and repurposing deserves similar recognition. Without functioning markets, circularity objectives remain difficult to translate into everyday commercial decisions.

Conclusion: Turning Regulation into Practice

Europe has invested heavily in producing batteries. It has created ambitious rules governing their sustainability and end-of-life management. It is investing heavily in recycling.

The missing piece is the infrastructure that allows batteries to move efficiently between these stages.

As millions of electric vehicles eventually leave European roads, the batteries inside them will represent an increasingly important stock of embedded energy capacity, critical materials and economic value. Some should be recycled immediately. Others may have substantial productive life remaining.

Europe needs a market capable of distinguishing between them and directing each battery toward the most appropriate lawful next use. That requires trusted diagnostics, common data, transparent valuation, regulatory clarity, traceability, interoperable systems and functioning cross-border transactions.

The circular battery economy will not emerge from regulation alone.

It will emerge when those rules can be translated into thousands of routine commercial decisions: when a dismantler can understand the value of a battery, a repairer can confidently source one, an energy-storage company can assess its suitability, a logistics provider can move it safely and every participant can document what has happened.

Europe has built much of the regulatory framework for circular batteries. The next task is to build the market that makes it work.

About Rebattex

Rebattex AB is a Swedish company developing digital market infrastructure for second-life EV batteries. The company works with participants across the battery value chain to address practical barriers to reuse, including battery identification, diagnostics, traceability, regulatory documentation and transaction workflows.

This policy paper draws on Rebattex's work with stakeholders in the European battery ecosystem and is intended to contribute to the wider discussion on how Europe can turn circular-battery policy into functioning markets.