ELAG
Policy Brief
August 2023

The new EU Battery Regulation:

Redefining the value of battery waste ?

Chloe Depledge, University of Agder

UiA University of Agder

INTRODUCTION

In August 2023, the long-awaited regulatory update for batteries and waste batteries comes into force in the European Union [1]. This framework aims to establish measures for a more circular battery value chain, from due diligence to carbon footprint labelling. The accompanying changes are also expected to facilitate the further recycling, reuse, and repurposing of waste batteries in the European market. This brief outlines the main features of the regulation and unpacks their impact on actors operating in the end of life battery (EOL) market.

[1] REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL concerning batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC

A NEW ERA FOR BATTERY GOVERNANCE IN THE EUROPEAN UNION

Over the past decade, the EU battery value chain has largely been governed through the Battery Directive [2], with a primary focus on waste management and disposal. However, due to shifting trends and rapid growth in demand for batteries, significant revisions have been deemed necessary to ensure sustainability across the wider battery lifecycle. A new Batteries Regulation was recently voted in by the European Parliament and came into force on 17th August 2023. It provides a comprehensive framework for batteries manufactured and sold in the EU, extending over all battery types including portable, industrial, starting, lighting and ignition (SLI), light means of transport (LMT) and electric vehicle (EV) batteries. The initiative is a part of the broader European Green Deal, which seeks to transform the EU into a fair, prosperous, and carbon-neutral society by 2050. The main aims of the Regulation include:

01 **Ensuring sustainability by reducing the environmental and social impacts associated with batteries.**

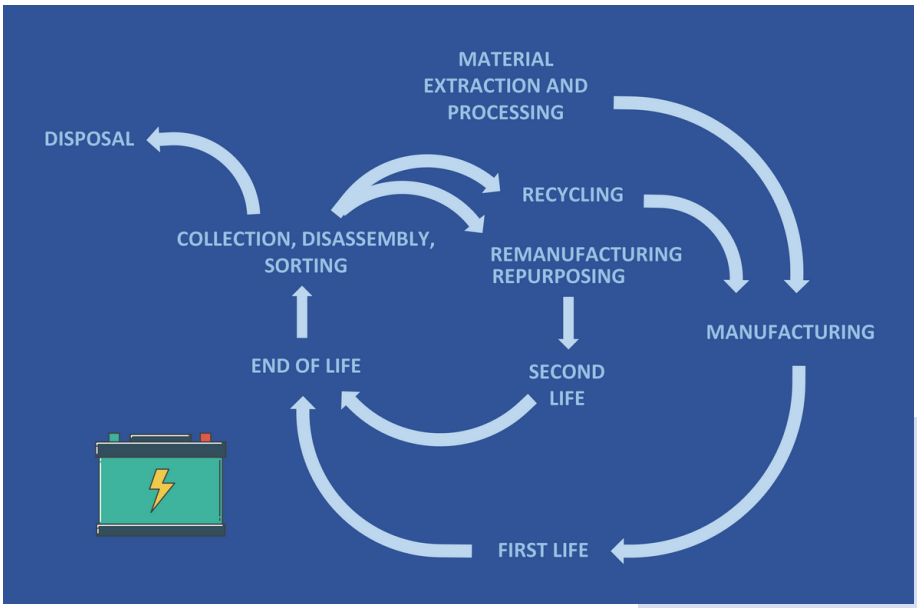
02 **Furthering the circular economy by addressing the entire lifecycle of all batteries and updating the management of waste batteries.**

03 **Creating a harmonised regulatory framework for all batteries in the EU to bolster the internal market.**

[2] Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC

KEY END OF LIFE REGULATORY MEASURES

By embracing a circular economy approach, the Regulation is expected to strengthen the growing Norwegian EOL market. Various measures have been introduced to improve the current management of waste batteries and recognise the value of solutions such as the recycling, remanufacturing and repurposing of batteries.



Left:
Circular battery life cycle depicting alternative EOL pathways.

The key changes under the new Regulation are outlined in the following section.

"Batteries are full of valuable materials and we want to ensure that no battery is lost to waste"

Virginijus Sinkevičius, EU Commissioner for Environment, Oceans and Fisheries - 10/12/2020

ESTABLISHING IMPROVED WASTE MANAGEMENT:

The Regulation advances extended producer responsibility for battery manufacturers. In accordance, producers or producer responsibility organisations must offer take back batteries gratis in collection schemes, as well as finance the further treatment and recycling of waste batteries. Similarly, producers are responsible for the promotion of these EoL options to end users. This will be communicated through battery QR codes, which gives access to information on the separate collection of waste batteries and available collection schemes. More informed consumer decisions are hoped to increase available waste battery streams in recycling, reuse and repurposing pathways.

EPR applies to all "economic operators" whom introduce batteries to the EU market. In this way, EOL actors re-entering repurposed batteries are treated as producers and are responsible for the collection, treatment and recycling of batteries following second life use.

Relevant articles

Article 56: Extended producer responsibility (EPR)

Article 61: Collection of waste electric vehicle batteries

ACCELERATING CIRCULAR SUPPLY CHAINS:

Due to the chemical composition of batteries, the ban on landfilling batteries is maintained as under the previous Directive. Ambitious recycling recovery rates are instead pushed for battery materials: 90% for cobalt, copper, lead, nickel, and 50% for lithium by the end of 2027. New recycling targets have also been introduced for different battery types. As the most common battery used in electric vehicles, lithium-ion batteries have a target efficiency rate of 65% set for the end of 2025 and 70% in 2030.

The Regulation sets a minimum recycled content requirement for new batteries. This is subject to future changes based on supply chain concerns and the availability of recycling technologies, however the following requirements stand at present: 16% for cobalt, 85% for lead, 6% for lithium and 6% for nickel, which must be recorded in "recycled content documentation". By documenting this, it allows for a more accurate carbon footprint declaration to be calculated, which accounts for the environmental impact of the battery life cycle. Over the long term, this can contribute to establishing more distinct battery performance classes.

Recycled content minimums and battery carbon footprints only cover first use batteries and do not apply for second life operators. However, the above targets are expected to generate significant investments in the EOL sectors; for the second life market to capitalise on its function as a time buffer, and for recycling to develop scalable technologies.

Relevant articles

Article 7: Carbon footprint of EV, LMT & rechargeable industrial batteries
Article 8: Recycled content requirements
Article 71: Targets for recycling efficiency & recovery of materials

INITIATING INFORMATION SHARING:

Crucially, digital battery passports have been introduced for BESS, EV and LMT batteries over 2kWh. Second life actors can access valuable information held in the battery management system (BMS), including the battery model and dynamic data from the use phase. This allows operators to establish the remaining useful life of batteries, mitigating the need for capital- and time-intensive testing procedures currently needed to identify suitable second life applications. Increased data availability will also allow recycling operators to determine if batteries are suitable for specific recycling treatments, with passports containing knowledge about the material composition of battery components and content of hazardous substances. The following information requirements will be documented on the digital battery passport:

Battery model information: for the general public

- Technical information (Annex VI)
  - Battery category, origin & date, warranty, weight & rated capacity, material composition inc. recycled content, extinguishing agent, voltage, power capability, est. cycle lifetime inc. reference test & its C-rate, capacity threshold for exhaustion, temperature range, internal resistance of cell and pack, round trip efficiency.
- Carbon footprint information (Article 7)
- Recycled content information (Article 8)
- Marking requirements (Article 13)
- EU declaration of conformity (Article 18)
- Due diligence reporting information (Article 52)
- Waste management of batteries information (Article 74)

Unique battery information: for interested parties

- Values for performance and durability parameters (Article 10, Annex XIII):
  - Performance e.g. capacity, energy, voltage, power capability, self-discharge, internal resistance, and
  - Durability e.g. expected lifetime, temperature, negative events during use, detailed composition, component part numbers and replacement sourcing, dismantling information, safety measures
- Electrochemical performance (Annex IV)
- SOH and RUL estimations (Article 14, Annex VII)
- Battery status e.g. “original”, “repurposed”, “waste” etc. (Annex XIII)

Overall, information sharing will facilitate the value assessment of used batteries, leading to the quicker processing of used batteries, safer handling, and more feasible automation of EOL processes (e.g. characterising, sorting, dismantling and recycling).

Relevant articles

Article 10: Performance & durability requirements for electric vehicle batteries
Article 13: Labelling, marking & information requirements
Article 14: Information on the state of health & expected lifetime of batteries
Article 65: Digital battery passport

EMBRACING A SECOND LIFE APPROACH:

The Regulation aims to build on the emerging second life ecosystem. Upon the start of a battery's second life, the BMS software reset function requirement allows the preparation of batteries for new use applications. At the same time, responsibility for the battery passport is transferred across the chain of custody to second life actors, who are classed as responsible economic operators following market re-entry. In order to reflect the transition from first to second life, batteries must also be reclassified. Several conditions should be met in order to reclassify waste batteries:

- SoH evaluation and recorded battery capability suitable for second life application
- Proof of transfer of ownership
- Evidence of appropriate means of protection during transportation and handling

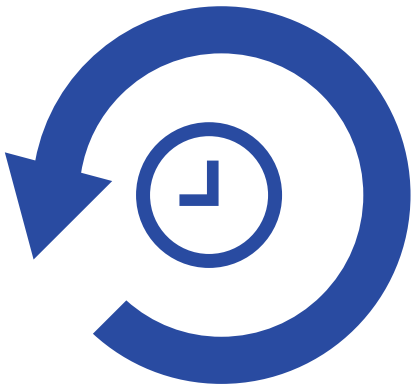
Following this, batteries may be subject to different rules depending on the new application. Repurposed batteries are likely to fall under the designation of "industrial" batteries, which encompasses both repurposed batteries in industrial applications, and those used for private or domestic BESS applications. Furthermore, additional rules apply for batteries used in BESS regarding the testing of safety parameters.

These new measures help to leverage the burgeoning second life market by facilitating legal transfers of both ownership and function, which allow second life actors more recognition in the battery industry.

Relevant articles	**Article 12: Safety of stationary battery energy storage systems (BESS)** **Article 14: Information on the state of health & expected lifetime of batteries** **Article 45 Obligations for economic operators of second life batteries** **Article 73: Preparation for re-use or repurposing of waste batteries**

TIMELINE

As the Regulation comes into effect, battery actors need to prepare well in advance of regulatory requirements becoming mandatory. The following articles will introduced gradually in the coming years:



Key EOL regulations	Data of implementation
Article 10: Performance and durability requirements Article 12: Safety of stationary battery energy storage systems Article 14: Information on the state of health and expected lifetime of batteries	**August 2024** (12 months following enforcement of regulation)
Article 71: Targets for recycling efficiency and recovery of materials	**December 2025, in December 2030** **December 2027, in December 2031**
Article 7: Carbon footprint declaration Article 13: Labelling, marking and information requirements	**August 2026** (36 months following enforcement of regulation)
Article 65: Digital battery passport	**February 2027** (42 months following enforcement of regulation)
Article 8: Recycled content in industrial batteries, electric vehicle batteries, LMT batteries and SLI batteries	**August 2028, August 2031** (60 months and 96 months following enforcement of regulation)

TOWARDS THE FUTURE: impacts on EOL actors

The table presented below highlights key EOL barriers that have been identified, along with their corresponding resolutions within the framework of the new Regulation and the resulting implications for actors involved in EOL process.

Key EOL barriers	How addressed in new Regulation?	Implications for EOL actors
Lack of standardisation between batteries	• Digital battery passport • BMS access for key performance and health indicators	• Largely mitigates need for characterisation of EOL batteries
Lack of established business market	• Battery collection and recycling rates • Batteries prepared for second lives considered as "new"	• Increased waste streams deploys investment for EOL infrastructure upscaling. • Redefining battery waste showcases extended battery life's value
Economic viability	• Min. recycled content • National incentives for recyclers who exceed rates	• Recycling targets increases recyclers' shares of material supply chain and will continue to generate significant investment • Lower cost processing can drastically improve resale prices of second life batteries
Original equipment manufacturer (OEM) responsibility	• Extended EPR in chain of custody • OEM-run take back scheme for end users • Repurposing actors considered as "producers" upon market placement	• Potential control of second life ecosystem by OEMs • Transfer of liability from OEMs to repurposing actors gives access to data records, but requires more comprehensive EOL documentation for both parties
Lack of public awareness of EOL pathways	• Labelling and promotion of battery EOL initiatives and collection points as per responsibility of OEMs	• Informed consumer choices regarding management of EOL batteries
Safety concerns over retired batteries	• Data sharing for safer disassembly • Clear guidelines/standards for safe transport, storage, disposal and BESS • Screening of repurposed batteries	• Traceability allows the monitoring of safety parameters over lifetime to avoid thermal runaway etc. during handling • Additional testing requirements for repurposing actors before resale

CONSIDERATIONS:

- Further standardisation of battery evaluation procedures needed, with the current legislative gap potentially affecting the comparability and benchmarking of batteries and their associated parameters.
- Mechanisms should be put in place to ensure fair market access to independent EOL operators and avoid manufacturers monopolising the second life ecosystem under EPR.
- More incentives for battery second life actors to match the benefits offered by recycling, namely the inclusion of second life batteries in the carbon footprint calculation to reflect the environmental benefits.

FURTHER INFORMATION

This policy brief is part of a three year RFF-funded research project with the ELAG Consortium (Exploiting the potential of spent electric vehicle batteries, Electric Agder). It includes collaborative efforts to determine how used EV batteries can be automatically processed for use in second life storage applications, along with partners BTG, Hydro, Elkem, Greenwaves, Greenstat, Batteriretur, Pixii and UiA.

CONTACT

UNIVERSITY OF AGDER TEAM

Author	chloe.depledge@uia.no
Circular Economy Lead	reyn.oborn@uia.no
Project Coordinator	bernhard.faessler@uia.no