ADVANCED RECHARGEABLE & LITHIUM BATTERIES ASSOCIATION

Fostering a resilient European battery value chain through closing the loop for battery materials

A Whitepaper on Black Mass

Introduction

The nascent European battery industry is under pressure. Externally, an uneven playing field, created by massive subsidy schemes in North America and Asia threatens Europe's competitiveness. Internally, Europe's battery value chain is struggling to ramp up its cell production capacity, heavily impacted by the lagging demand in EV uptake. Those effects combined have led to delays, scaling down and even cancellation of numerous projects along the entire battery value chain, including the battery material supply chain where recycling plays a vital role to provide secondary materials for cell production.
This negative trend threatens the development of a competitive and resilient European recycling industry and puts Europe's strategic autonomy and decarbonization ambitions at risk.

Recycling of batteries will reduce the need for primary natural resources necessary for battery production, thus both reducing the need to mine new materials – as well reducing Europe's dependencies on third countries, if recycling is performed in Europe.

Today, however, the European battery recycling industrial base mainly consists of pre-processing operators; whereas post-treatment or "refining" of Black Mass activities takes place outside the EU. Additionally, a lack of accurate data on real installed capacities in Europe and for each step of the battery recycling value chain hampers the understanding of the market and its opportunities for investors.

In this whitepaper we outline the importance to keep and process this valuable material, the Black Mass, within Europe to stimulate the creation of a closed-loop recycling ecosystem in Europe and present suggestions to adjust the existing regulatory framework, as well as some novel recommendations.

Executive summary

Fostering the creation of a sustainable and vital recycling ecosystem in Europe, is a perquisite for enhancing the region's strategic autonomy and for reaching its sustainability goals.

The battery recycling value chain can be divided into different steps.

It starts with the collection followed by the mechanical treatment of End-of-Life batteries and production scrap to create a powder known as Black Mass (BM). Those first steps mostly take place in the EU with many players developing small factories (< 10kt/year Black Mass production capacity) for battery recycling as those "pre-treatment" steps have a low barrier to entry with low CAPEX investment and limited technology hurdles.

The post-treatment or "refining" of Black Mass that leads to the recovery of the valuable battery metals, namely nickel, cobalt and lithium is more challenging. It has higher entry barriers with significantly higher CAPEX investment needs and high technological competences.

At the present time, most of the Black Mass, which contains multiple valuable and strategically important battery materials leaves EU to be refined elsewhere, mainly in South-East Asia. This material leakage threatens Europe's ambition to establish a circular battery industry that will help decrease raw-material dependencies whilst increasing Europe's strategic autonomy and resilience.

RECHARGE recommends the following improvements to the existing Regulation as well as some suggestions for future legislation to stop the leakage of Black Mass from Europe and improve the business model of batteries recycling in Europe:

The Battery Regulation and its Delegated Acts:

Delegated Acts are to be issued without further delay and should be monitored for active enforcement. Definitions and calculation methodologies should be clarified without delay to create investment certainties as well as a level playing field both within Europe as well as on a global level.

RECYCLING EFFICIENCY (RE) AND RECOVERY OF MATERIALS (RM) OBLIGATIONS

Clearly define the calculation methods for RE and RM and establish criteria for in order to avoid interpretations of "equivalent conditions".

A BETTER AND STANDARDISED DEFINITION OF BLACK MASS

Adopt a clear definition of BM to ensure that no BM inadvertently becomes classified as a product, so as to limit the export of this strategic resource outside of the EU.

CFP CONSIDERATION

Require that for critical raw materials recycling, only company-specific (primary) data may be used to incentivises recycling with lower CFP technologies, over low-cost recyclers using overly optimistic industry average default values.

CALCULATION OF RECYCLED CONTENT TARGETS

Calculation rules should minimize the negative impacts of this target by including incentives for producers and EU battery manufacturers to recycle their waste batteries and production waste in Europe.

The EU List of Waste

A STRICTER "WASTE CLASSIFICATION" OF BM

As an addition to the delegated act on RE and BM calculation, the Commission could publish a guidance document explaining that BM and all its derivatives are considered 'waste' until they have undergone a refining process. This guidance document would assist Member States in assessing whether fractions from battery manufacturing waste are still considered waste.

The Waste Shipment Regulation

GUIDELINES AND ENFORCEMENT OF "EQUIVALENT CONDITIONS"

Clear guidelines for MSs are urgently needed, especially regarding OH standards and emissions to enforce the concept of "equivalent conditions".

Future regulatory framework – Suggestions

DEVELOPMENT OF A EUROPEAN SINGLE MARKET FOR RECYCLING

A European Single Market for recycling facilitates the flow of black mass among EU Member States, helps secure sufficient volumes for recycling sites and thereby creates economies of scale, and will boost EU competitiveness by decreasing administrative burdens and costs for intra-EU-transport of BM.

BETTER CONTROL OF SHIPMENTS OF BLACK MASS, AND ESPECIALLY A BAN ON ITS EXPORT TO NON-OECD COUNTRIES

The introduction of reciprocal limits on the export of critical raw materials (waste) will limit the export to third countries that have themselves put in place export restriction measures on critical raw materials. Export fees on critical raw material waste could also be considered, which could then be used to finance investments in recycling capacity.

DYNAMIC (OR ROTATING) EU STOCKS FOR CRMS

Investigate innovative business models on retaining the CRM ownership throughout the lifecycle of a battery, supported by the implementation of the battery passport.

1. Context

1.1. What is Black Mass

In the context of this paper, "Black Mass" (BM) refers to the material released during the shredding of lithium-based battery (LiB) cells or modules, or from LiB manufacturing waste as defined in the BR. When generated from LiBs, BM contains a mixture of anode and cathode materials, particles from current collectors (aluminium and copper), and traces of solvents, electrolytes, and organic compounds present in the batteries. If BM is generated from LiB production waste, it may be a less complex mixture, depending on the stage of LiB manufacturing at which the waste was produced, but it will at least contain cathode materials[1].

All BM contains lithium (Li) and aluminium (Al) from the cathode material's current collector. BM from battery cells and modules will also contain copper (Cu) and, depending on the cathode chemistry, may include nickel (Ni), manganese (Mn), cobalt (Co), or iron (Fe) and phosphate.

1.2. Why is Black Mass recycling in Europe important?

The circular economy value of Black Mass (BM) primarily lies in its content of critical raw materials. Other key drivers for recycling include reducing the carbon footprint (as recycled metals typically have a lower carbon footprint than those produced from primary sources) and minimizing environmental impact by avoiding hazardous waste disposal[2].

Beyond the environmental benefits of battery recycling, there is also a geostrategic dimension. Various EU Institutions have emphasized the importance of domestic production and recycling of critical raw materials in several papers. The Critical Raw Materials Act (CRMA)[3] sets benchmarks for recycling and highlights the essential role of battery recycling in achieving the EU's sustainability goals and enhancing its strategic autonomy through access to critical raw materials necessary for battery production. The Draghi report advocates for a comprehensive approach to improving battery recycling, integrating technological, regulatory, and economic measures to meet the EU's sustainability and competitiveness objectives[4].

These geopolitical advantages can only be realized if the Black Mass remains within Europe.

1.3. Market Potential

The market for lithium-ion battery (LiB) recycling is experiencing exponential growth. In the first decade, the majority of recyclables will come from battery production waste. However, end-of-life batteries are expected to become more dominant between 2030 and 2035[5].

[1] For the purposes of this paper, we will not consider BM that does not contain cathode material.
[2] Council adopts new regulation on batteries and waste batteries - Consilium
[3] Critical Raw Materials Act - European Commission
[4] EU competitiveness: Looking ahead - European Commission
[5] European battery recycling market analysis | Strategy&

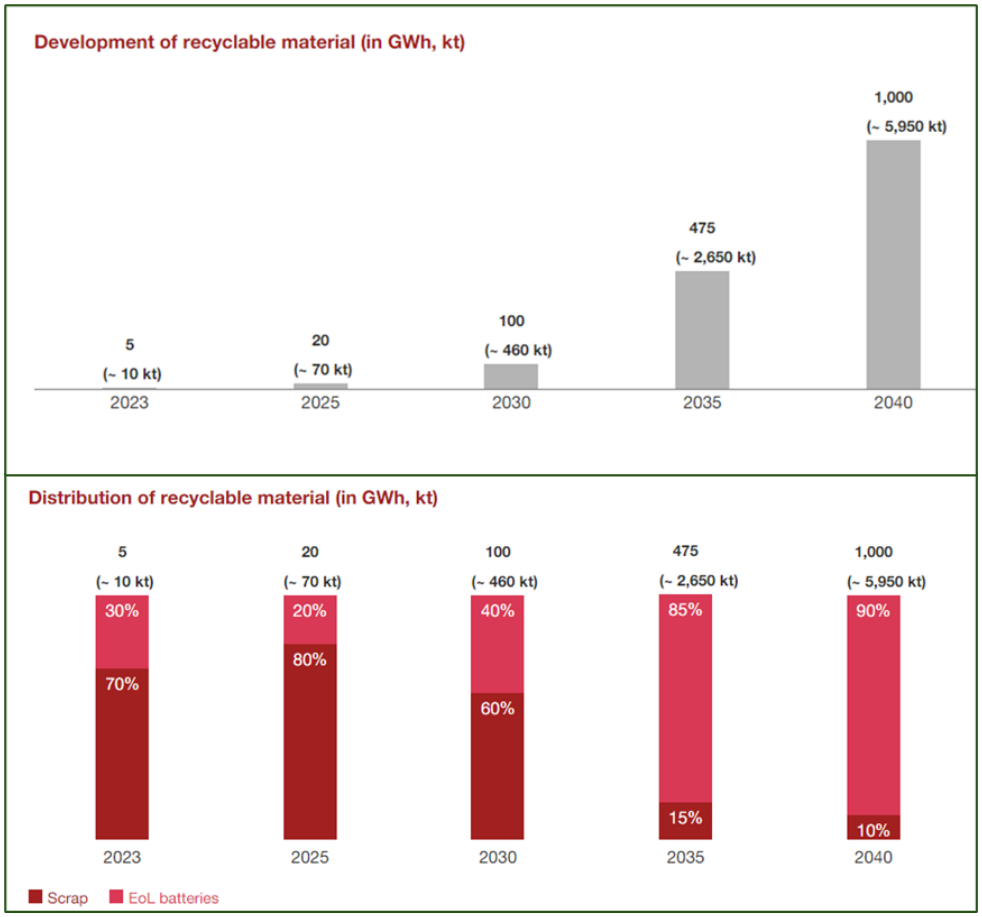


FIGURE 1 TOTAL POTENTIAL OF RECYCLABLE MATERIALS IN EUROPE AND SHARE OF PRODUCTION WASTE AND END-OF-LIFE BATTERIES GRAPHS FROM: EUROPEAN BATTERY RECYCLING MARKET ANALYSIS - A PROFITABLE AND SUSTAINABLE BUSINESS BEFORE 2035[6]

The total investment cost in EU recycling capacity for the anticipated volumes is substantial. The estimated cumulative investment by 2040 could reach up to €10 billion[7, 8].

1.4. What are the drivers for Black Mass Leakage?

Despite the market potential and the political will to retain critical raw materials waste within Europe, there is significant leakage of BM outside the continent. The primary reason for this is a shortage of refining capacity. Several EU battery recycling companies have announced delays in their investment plans. Although the announced and estimated capacities currently align with existing needs, the number of announcements is decreasing year after year, while the demand is expected to grow exponentially[9].

[6] European battery recycling market analysis | Strategy&

[7] What is the market potential for sustainable battery recycling in Europe? - Fraunhofer ISI

[8] The EU recycling market –a viable and sustainable business; Joint study between Strategy& and PEM of RWTH Aachen University August 2023

[9] https://www.linkedin.com/posts/hansericmelin_like-a-collapsed-souffl%C3%A9-activity-7257058972048728067-n_zi?utm_source=share&utm_medium=member_desktop

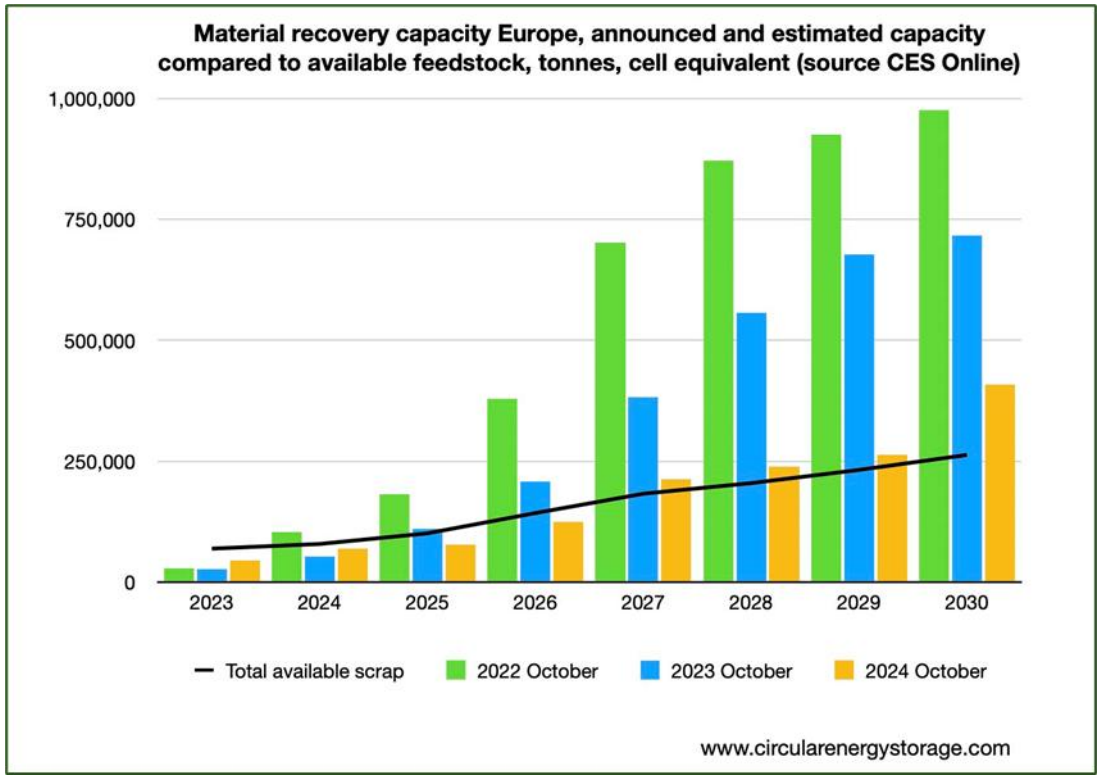


FIGURE 2 FROM CES ILLUSTRATING THE GAPS BETWEEN INCREASING DEMAND AND DECREASING ANNOUNCEMENT OF RECYCLING CAPACITIES IN EUROPE

To understand this paradox, it is important to recognize that battery recycling is a multi-step process. While some battery recycling methods can treat lithium-ion battery (LiB) cells and modules without generating Black Mass (BM) as an intermediate stage, shredding batteries is typically the first recycling step after dismantling full battery packs. This is a relatively straightforward process with low investment costs.

The subsequent steps, which involve a series of hydrometallurgical refining processes, are much more complex and require significant capital investments. The lack of investment is primarily in this second part of the value chain.

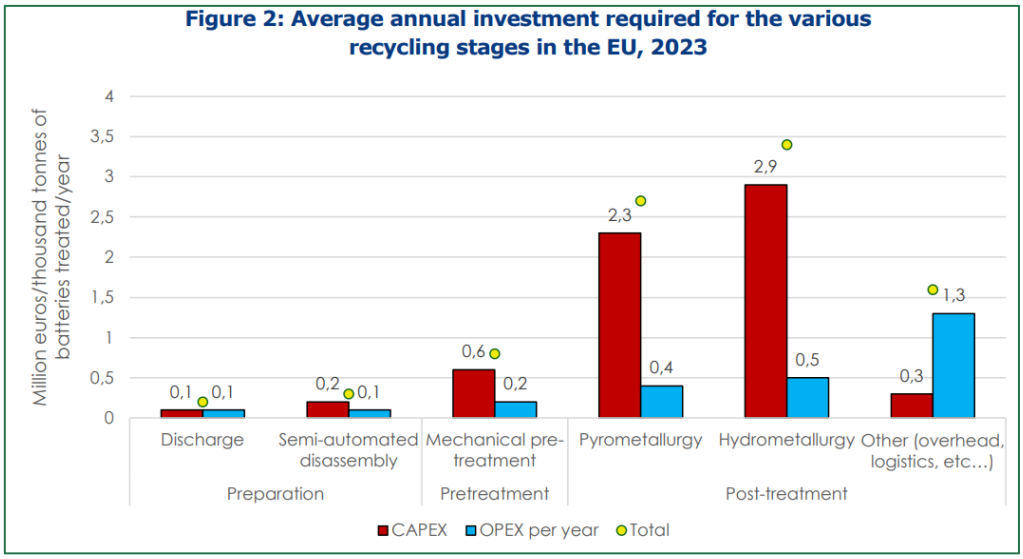


FIGURE 3 FROM IFRI, BASED ON "THE EU RECYCLING MARKET – A VIABLE AND SUSTAINABLE BUSINESS". JOINT STUDY BETWEEN STRATEGY& AND PEM OF RWTH AACHEN UNIVERSITY, PWC, RWTH AACHEN UNIVERSITY, 2023, P.15, AVAILABLE AT: WWW.STRATEGYAND.PWC.COM.

Despite the anticipated exponential growth in production waste and end-of-life batteries, European investments in refining capacity are not only lagging behind, in fact most of the European refining projects have been abandoned or postponed in 2024. With little or no capacity to process the BM in Europe (very limited pCAM production, also here with numerous abandoned projects) there is no existing market for further refinement and processing of the BM in Europe.

There are three main reasons for this:

1. **Lower volumes to be recycled than anticipated and other uncertainties hampering investments in recycling capacity in Europe**.
   Several market changes have reduced the quantity of recyclables in Europe:
   - Delay in the electrification of mobility: The review of several state aid measures to promote a switch to electromobility and the debate on revising interim CO2 reduction targets have resulted in lower than anticipated sales of EVs in Europe.
   - High share of imported EVs: The high proportion of imported EVs reduces the need for EU battery production, resulting in less battery production waste.
   - Difficulties in ramping up European cell production capacity: The decline in battery production has a direct impact on the scrap generation from European battery manufacturing plants.
   - Lack of investment certainty: Beside the low volumes of battery production scraps, gigafactories (scraps producers) are often hesitant to engage in long-term offtake agreements as yearly based contracts will give more flexibility to switch to better offers/business models. Without long-term visibility and certainty makes it difficult to take investment decisions.
   - Technology development: As refining process depend on chemistry choices, uncertainty on volumes for different battery chemistries (mainly LFP vs NMC) will hold back investment decisions. Additionally, the recycling of NMC vs LFP has quite different economic prerequisites and viable recycling technologies for Mn, Li and graphite still only under development in the EU.

- Longer than anticipated battery lifetimes[10],[11]: While this is a positive development, it delays the need for recycling capacity.

2. **Competition with (state-aid supported) recycling capacity outside Europe**: Overcapacity of recycling and refining installations in Asia, often constructed with state aid or by using existing depreciated refining facilities, results in aggressive market conditions. Traders for BM exports are willing to pay significantly more than EU recyclers since non-EU refiners (notably in Asia, Korea) are willing to pay higher prices due to their very competitive refining process. Additionally, many of these non-EU recycling companies operate under lower Environmental, Health, and Safety (EHS) standards than EU recyclers, resulting in a lower cost position. A potential change in the Chinese legislative framework, authorizing once again the import of BM might lead to even more aggressive market conditions globally.
   Furthermore, in the USA, several recycling initiatives have been supported by significant state aid under the Inflation Reduction Act (IRA)[12]. To initiate a high-risk and capex intensive recycling and refining process in Europe, recycling business need incentives like those provided to businesses outside of Europe.

3. **Unclear EU Regulatory Framework**: Several delegated acts related to the EU battery regulation lack clarity, resulting in delayed investment decisions. Some existing rules are insufficiently clear, and their non-harmonized application creates uncertainty. The uncertainty is further aggravated by delays in the finalization of the secondary legislation.

- Recycling Efficiency (RE) and Recovery of Materials (RM): The calculation methods for RE and RM are still, as of today, not clearly defined. These rules will impact which recycling processes are deemed compliant. Rules should be fit for purpose.
- Lack of battery carbon footprint: The current lack of a simple carbon footprint calculation methodology delays investment decisions.
- End-of-Waste Criteria: The interpretation of end-of-waste criteria varies significantly between Member States. Materials considered as 'waste' in one member state may be regarded as 'end-of-waste' in another, leading to leakage of intermediates containing critical raw materials.
- Waste Shipment Regulation: Waste may only be exported outside the EU if it is processed under 'equivalent conditions'. However, the definition of equivalent conditions, what is considered equivalent, and the enforcement of these rules are very unclear.
- Absence of harmonization between Member States in implementation of the Battery Regulation: A clarification that the Member States authorities are responsible for the verification of the "first recyclers" reports, including harmonized content requirements of such reports are needed. This will also support the harmonisation between Member States in terms of sanctions for non-respect of the obligations in the Battery Regulation.

The following chapter will focus on suggestions to improve the current regulatory framework and how those can positively impact investment decisions.

[10] https://news.stanford.edu/stories/2024/12/existing-ev-batteries-may-last-up-to-40-longer-than-expected
[11] https://www.p3-group.com/en/p3-updates/battery-aging-in-practice/
[12] Redwood Materials raises over $1 billion in Series D investment round; LPO Announces a Conditional Commitment for Loan to Li-Cycle's U.S. Battery Resource Recovery Facility to Recover Critical Electric Vehicle Battery Materials | Department of Energy; Ascend Elements | Ascend Elements Raises Additional $162 Million to Build Sustainable Lithium-Ion Battery Materials in United States

2. The existing regulatory framework

The main existing regulatory tools that can support keeping critical raw materials from battery waste in Europe are:

- The Battery Regulation and its Delegated Acts
- The EU List of Waste
- The Waste Shipment Regulation

Although these tools do not primarily aim to retain Black Mass (BM) or critical raw materials containing waste in Europe, they can support a 'no-leakage' policy. **We do not suggest stretching current provisions but rather a strict application and verification by the competent member states**.

2.1 The Battery Regulation and its Delegated Acts

The Battery Regulation (BR) applies only to batteries. Production waste, unless it comes in the form of batteries (like cells, modules, or complete packs), is not subject to the BR. As in the coming years, the major input in battery recycling processes will be production waste (see Figure 1) it will remain difficult getting access to sufficient Recycled Content to serve EU battery manufacturers.

Under the BR, waste batteries or fractions thereof that are recycled outside the EU, only count towards fulfilling Recycling Efficiency (RE) and Recovery of Materials (RM) obligations if they are recycled under equivalent conditions as in the EU, and this is attested by the destination country. The

GOOD: The combination of these two rules makes the export of BM more difficult (it's export of waste, not of a product, and the verification of the equivalent conditions). It creates a burden for the exporter, who must know the downstream processes and verify whether the RE and RM will be achieved. Moreover, the exporter needs to obtain formal attestation from the competent authorities in the destination country.

WEAK: The requested certificate is a requirement of the BR, but has been omitted in the current draft delegated act reporting template that does not require attestation from the destination country. The Member State of the exporting country has no clear guidelines on how to verify the RE and RM claims made by the exporter. The BR empowers the Commission to adopt a delegated act to lay down detailed rules for the assessment of 'equivalent conditions,' but without a specified timeframe.

SUGGESTION: In the reporting template, include the requirement for batteries (or fractions thereof) recycled outside the EU to include a declaration, attested by the destination country, that the batteries have been recycled under 'equivalent conditions' as in the EU. Member states verifying the RE and RM claims should only accept reports from exporters acting as 'first recyclers' if they can submit this attested declaration. MS should have a common list of key elements that need verification (material recovery rate, etc), in order to avoid interpretation of "equivalent conditions" (see also the recommendation on "equivalent conditions under the Waste Shipment Regulation). To ensure a level playing field between EU States, the quality of the reports that are received by the Members States should be audited by the EU Commission.

draft delegated act on RE and RM calculation specifies that BM is an 'intermediate' and not an output fraction. This implicitly indicates that the treatment of BM is still a recycling operation, and that BM is still considered waste.

The draft delegated act on the calculation of RE and RM states that BM is an intermediate of the battery recycling process.

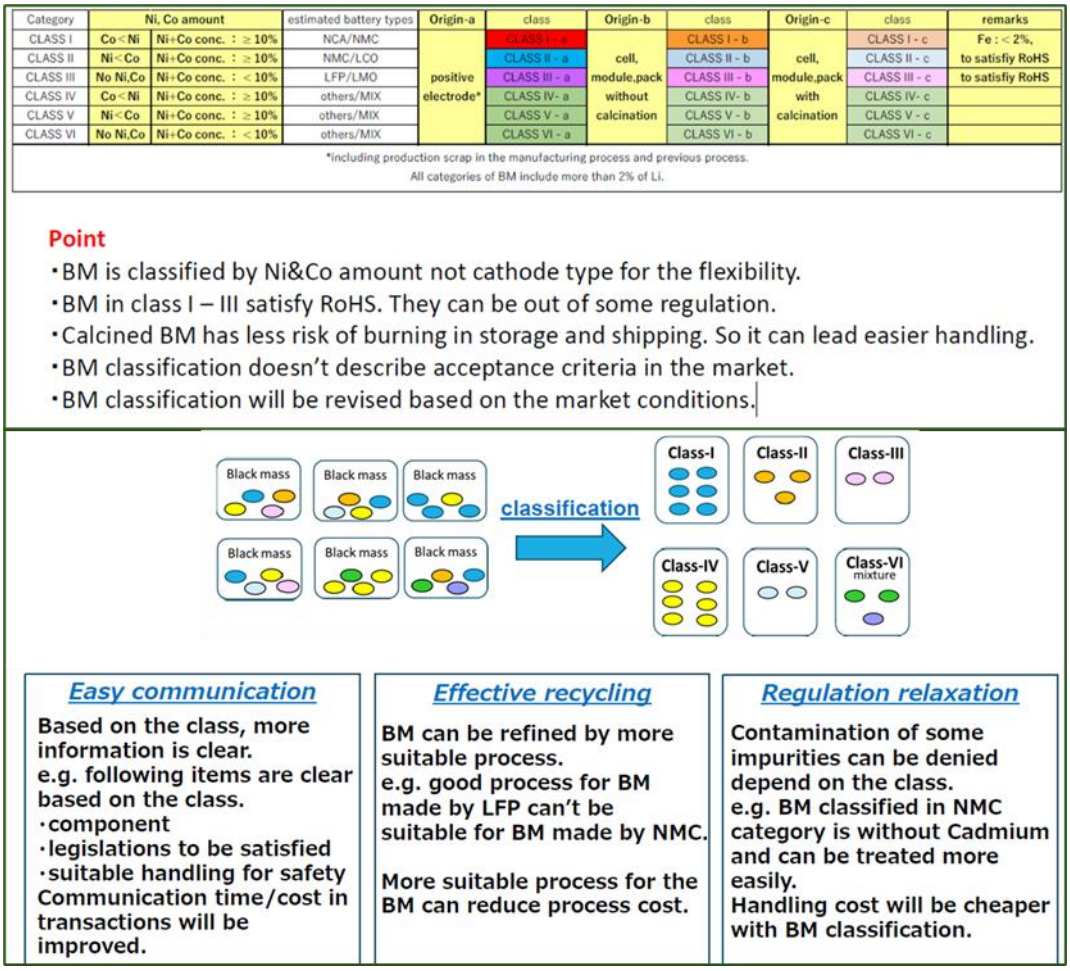
GOOD: As this implicitly indicates that BM is still considered waste, it will hamper the export of BM.

WEAK: The draft delegated act only specifies that BM is an intermediate. Once the material no longer corresponds to the BM definition after additional processing, the recycler could declare it as a 'product' and export it freely for refining outside the EU.

SUGGESTION: Introducing a definition for BM ensures that no waste material inadvertently becomes classified as a product. The definition of BM could be broadened to include derivatives of BM, or it could be specified that for the purpose of RM, the output must be suited for industrial processes of manufacturing batteries or other NZIA-technologies.

A standardized classification of BM developed on a global basis by industry associations could address some of the mentioned issues.

A standardization approach is also under development at international level with the Japanese batteries value chain association, BASC. Proposals are discussed to create technical categories of Black Mass according to its content, its origin and its level of treatment. The figure below describes this classification proposal.



Category	Ni, Co amount		estimated battery types	Origin-a	class	Origin-b	class	Origin-c	class	remarks
CLASS I	Co＜Ni	Ni+Co conc. ： ≥ 10%	NCA/NMC	positive electrode*	CLASS I - a	cell, module,pack without calcination	CLASS I - b	cell, module,pack with calcination	CLASS I - c	Fe : ＜2%,
CLASS II	Ni＜Co	Ni+Co conc. ： ≥ 10%	NMC/LCO		CLASS II - a		CLASS II - b		CLASS II - c	to satisfiy RoHS
CLASS III	No Ni,Co	Ni+Co conc. ： ＜10%	LFP/LMO		CLASS III - a		CLASS III - b		CLASS III - c	to satisfiy RoHS
CLASS IV	Co＜Ni	Ni+Co conc. ： ≥ 10%	others/MIX		CLASS IV- a		CLASS IV- b		CLASS IV- c	
CLASS V	Ni＜Co	Ni+Co conc. ： ≥ 10%	others/MIX		CLASS V - a		CLASS V - b		CLASS V - c	
CLASS VI	No Ni,Co	Ni+Co conc. ： ＜10%	others/MIX		CLASS VI - a		CLASS VI - b		CLASS VI - c	

*including production scrap in the manufacturing process and previous process.
All categories of BM include more than 2% of Li.

Point

- BM is classified by Ni&Co amount not cathode type for the flexibility.
- BM in class I – III satisfy RoHS. They can be out of some regulation.
- Calcined BM has less risk of burning in storage and shipping. So it can lead easier handling.
- BM classification doesn't describe acceptance criteria in the market.
- BM classification will be revised based on the market conditions.

Easy communication

Based on the class, more information is clear.
e.g. following items are clear based on the class.
・component
・legislations to be satisfied
・suitable handling for safety
Communication time/cost in transactions will be improved.

Effective recycling

BM can be refined by more suitable process.
e.g. good process for BM made by LFP can't be suitable for BM made by NMC.

More suitable process for the BM can reduce process cost.

Regulation relaxation

Contamination of some impurities can be denied depend on the class.
e.g. BM classified in NMC category is without Cadmium and can be treated more easily.
Handling cost will be cheaper with BM classification.

FIGURE 3: DRAFT PROPOSAL AND ADVANTAGES OF A HARMONIZED BM CLASSIFICATION FOR BM CLASSIFICATION BY BASC, THE BATTERY ASSOCIATION FOR SUPPLY CHAIN (BASC), PRESENTED IN THE FRAMEWORK OF THE WORLD BATTERY FORUM.

A standardized definition of BM can also help develop harmonised and transparent data on black-mass flows and recycling capacities. This will create business opportunities by giving greater transparency of available feedstock and support policy making by public authorities.

Recycling is part of the carbon footprint calculation. Under the draft delegated act on carbon footprint calculations, 80% of the credits for recycling (the difference between the carbon footprint of secondary materials compared to primary materials) must be allocated to the manufacturer. These manufacturers have an objective advantage to recycle their batteries with a 'low impact' recycler. Therefore, they need to know where the batteries will be recycled.

GOOD: The credits will incentivize producers to understand the recycler's processes, reducing the likelihood of simply opting for the cheapest (out of Europe) recycler.

WEAK: The overall impact of recycling on the batteries' carbon footprint is relatively small. If producers do not know the exact recycling process, they can use default values, which are based on industry averages. These figures are sometimes overly optimistic because they are mainly based on input from companies that have already made efforts to lower their carbon footprint. The balance between costs and credits can tip in favor of 'costs'. The long lifetime for EV batteries (>15 years time difference between CF calculation when the battery is put on the market and the effective recycling) also creates challenges for the use of real process data and could render them inadequate…

SUGGESTION: Make default values for primary materials more 'pessimistic' (include primary sources with a higher-than-average carbon footprint); require that for critical raw materials recycling, only company-specific data may be used.

The Commission has not yet published any suggestions or proposals on the calculation of recycled content targets. Recycled content is a delicate objective: the easiest way to be compliant is to buy Chinese batteries (or complete EVs). China has the largest market for recyclables (both production waste and end-of-life batteries) and does not have domestic recycled content targets. China could relatively easily allocate recycled materials to batteries for export to the EU.

If the calculation rules include a provision on 'recycled in the EU' or 'recycled from batteries put on the EU market,' this could result in cannibalism of batteries that are suited for extended life (same or other applications).

SUGGESTION: Calculation rules should minimize the negative impacts of this target by including incentives for producers and EU battery manufacturers to recycle their waste batteries and production waste in Europe. Recycled Content could be allocated to OEMs that opt for closed loop options. RECHARGE submitted to the JRC recommendations for the ReCo calculation method.

2.2 The EU List of Waste

The draft delegated act on the 'Amendment to the European List of Waste to address waste batteries and wastes from treating them' classifies all waste lithium-ion batteries (LiBs) and black mass (BM) from recycling LiBs as 'hazardous waste.[13]' Waste from battery production is also classified as 'hazardous'. This classification is based on a science-based conclusion from a technical report published by the JRC.

GOOD: The classification of BM as hazardous creates a significant hurdle for export, making direct export to non-OECD countries almost impossible.

WEAK: The classification as 'hazardous' only applies to 'waste'. If a fraction of manufacturing waste or BM from battery recycling is considered 'end-of-waste', the material is no longer classified as hazardous waste. Additionally, there must be a transposition of hazardous waste codes into CN codes, as these are used by customs. Furthermore, if an OECD destination country considers BM as a product and not waste, it could easily be shipped further to a non-OECD country for refining.

SUGGESTION: As an addition to the delegated act on RE and BM calculation, the Commission could publish a guidance document explaining that BM and all its derivatives are considered 'waste' until they have undergone a refining process. Thermomechanical treatment should never be considered the final step of recycling, nor should the first step of refining be considered a 'purpose' (as one of the end-of-waste criteria). This guidance document would assist Member States in assessing whether fractions from battery manufacturing waste are still considered waste. Additional resources for Member State market surveillance authorities to perform border controls to ensure that waste shipments and documents fully comply with this new delegated decision will be needed. In addition, the EU's anti-fraud service (OLAF) must be allocated sufficient resources to monitor, investigate, and prevent illegal exports to non-OECD countries.

2.3. The Waste Shipment Regulation

Regarding the export of hazardous waste, the Waste Shipment Regulation (WSR) [14] requires that treatment facilities in the receiving country operate under conditions equivalent to those in the EU. This includes ensuring that the waste is treated in a manner that protects human health and the environment, and that the facilities meet similar standards for emissions, safety, and waste management practices.

This provision in the WSR outlines rules prior to the export of hazardous waste and complements the Battery Regulation (BR), which focuses on the end of the recycling process.

[13] Waste treatment – Amendment to the European List of Waste to address waste batteries and wastes from treating them

[14] Regulation (EU) 2024/1157 of the European Parliament and of the Council of 11 April 2024 on shipments of waste, amending Regulations (EU) No 1257/2013 and (EU) 2020/1056 and repealing Regulation (EC) No 1013/2006Text with EEA relevance.

GOOD: It is crucial for the EU to ensure that our waste does not contaminate non-EU countries. We must not allow our waste to negatively impact people and the environment in destination countries. If adequate precautions are not taken, Black Mass (BM) can expose operators to excessively high concentrations of hazardous compounds. This can and must be avoided.

WEAK: The criteria that exporters must verify and the strictness with which Member States (MSs) assess 'equivalent conditions' are insufficiently clear. Environmental and Occupational Health and Safety (OHS) standards, in particular, must be evaluated because operators are at the highest risk of exposure to hazardous compounds. Lower OHS standards imply lower costs for the operators, putting recyclers located in the EU in a competitive disadvantage.

SUGGESTION: Clear guidelines for MSs are urgently needed, especially regarding OHS standards. Comparable to the requirements of the BR on "equivalent recycling conditions" MS should have a common list of key elements that need verification specifically on the announced emissions of the recycling plants and comparison to the emissions authorized in EU, etc, in order to avoid interpretation of "equivalent conditions". To ensure a level playing field between EU States, the quality of the reports that are received by the Members States should be audited by the EU Commission.

3. Future regulatory framework?

The regulatory tools under (2) are mainly environmental and human health measures. Their purpose is not to retain critical raw materials in Europe. As soon as destination countries comply with EU Environmental and Occupational Health Standards, CRM leakage will be fully legal. Therefore, the EU should develop more dedicated rules to retain CRMs in the Union.

Rule makers should be conscious that this is not about battery recycling only. It is about the whole ecosystem of battery production and by extension all manufacturing industry based on critical raw materials. If the (battery) CRMs that have been imported once (either as raw materials or in appliances) but after their use phase are not recycled and refined in the EU, we will never develop a 'Net Zero Industry': the CRMs will re-enter Europe as EVs, as solar panels, as electrolysers etc. Only if we succeed in keeping raw materials in a circular loop in Europe, we will have a 'strategic autonomy'.

All upcoming relevant regulations under the Clean Industrial Deal, as the expected Circular Economy Act should develop tools for an active CRM retain policy.

3.1. Suggestions

3.1.1. Market creation for recycled materials based on competitive pricing and equivalent quality

According to the 'Political Guidelines for the New Commission'[15] (Ursula von der Leyen, Candidate for the European Commission President), the objective of the CEA is:

…. This will be the purpose of a new Circular Economy Act, helping to ***create market demand for secondary materials*** *and a* ***single market for waste, notably in relation to critical raw materials***.

The creation of a "single market for waste" is paramount to improve EU's competitiveness of its recycling industry. A European Single Market for recycling that facilitates the flow of black mass among EU Member States will help decrease administrative burdens and costs for intra-EU-transport of BM. This will create economies of scale and secure sufficient volumes for recycling sites. To achieve this, the European regulatory framework needs to be adequately adapted as soon as possible.

Secondly, as illustrated under 2.1 **Error! Reference source not found.**, recycled content targets are not the right tool for creating markets for secondary raw materials; they simply create a new dependency on imported recyclates or cannibalize the lifespan of appliances.

Under the 'polluter pays' principle, we advocate for the collection and closed-loop recycling[16] of critical raw materials (CRMs) financed by the Producers (as it is outlined in the Battery Regulation). The potential price gap between primary materials and equivalent recycled materials should therefore not be borne by the entity who buys recycled materials to produce new goods, but is part of the Extended Producer Responsibility.

Downcycling or open-loop recycling of CRMs should explicitly be considered as 'recovery' instead of recycling if an equivalent quality for net-zero-technologies as defined in the NZIA, is not reached.

High collection targets, quality requirements, and financing closed-loop recycling by the first producers are better tools for creating markets for recycled products. This approach avoids imports of cheap recycled materials into the EU and ensures that importers of goods co-finance the recycling. Once recycled to the equivalent quality of primary materials, the recyclates are more likely to remain in Europe, as they can compete on an equal basis with primary materials.

In summary, the business model for black mass recycling in Europe needs to be strengthened with a combined set of actions. These actions also need to look beyond recycling but look at how to foster the growth of a domestic battery material supply chain in all its parts, including pCAM and CAM production facilities to ensure European off-take capacities for the metals recycled in Europe.

[15] e6cd4328-673c-4e7a-8683-f63ffb2cf648_en

[16] In the context of this paper, 'closed loop recycling' means recycling of a CRM to a quality level that enables the use of the recovered CRM in application from where it can be recycled again for the use of its unique properties. 'Open loop recycling' means recycling of a CRM to a lower quality level that makes use in applications from where they can be recycled again impossible. 'Downcycling' means recycling of materials into a lower quality that only allows low end applications, where the unique properties of CRMs are not fully utilized.

3.1.2. Export limits on CRM-containing waste

High collection targets and quality requirements alone will not be sufficient to keep CRM-containing waste in the EU. As mentioned earlier, the export of (hazardous) waste for recycling 'under equivalent conditions' remains a significant leakage risk. Even if the environmental conditions and impact on human health are equivalent to those in Europe, recycling can often be done more cheaply outside Europe due to lower labour costs and subsidies.

Strict end-of-waste criteria for CRMs containing waste (granting end-of-waste status only at 'closed loop quality level') and a ban on the export of CRM-containing waste would be powerful tools to prevent CRM leakage.

3.1.3. Dynamic (or rotating) EU stocks for CRMs

We have to consider new innovative business models, e.g. business models where OEM's keep ownership of CRM's during the use phase to incentive closed loop recycling. In the case of an EV battery, this would mean that a car OEM sells a car with a battery, but the buyer only purchases the "right of use" of the Li, Co, Cu, Ni, P and precious metals inside. The buyer can use the battery and even sell the EV including the battery. The battery passport can be designed to track the ownership of the battery (if sold independently of the car). In such a model, the OEM becomes the full owner of the CRMs again after the use phase and can decide freely what to do with them: converting them back to battery materials or selling them.

A critical aspect of this model is: who will finance this stock? The OEM would have a partial CRM value (only the 'naked property') on its balance sheet, for which it does not generate a profit. This will negatively impact their Return on Capital Employed (ROCE). It could be a justified EU support mechanism under the EU Critical Raw Materials Act (CRMA) to compensate for the financing of this 'rotating stock', on the condition that after the use phase, the OEM returns the materials to the EU economy.

Such a rotating stock would be more efficient than a 'dead' warehouse stock, as it creates functional value. The flip side is that the materials are not immediately available. Statistical models, including lifetime expectations, can predict how much CRMs will be available at any time.

ABOUT RECHARGE
RECHARGE is the European industry association for advanced rechargeable and lithium batteries. Founded in 1998, it is our mission to promote advanced rechargeable batteries as a key technology that will contribute to a more empowered, sustainable and circular economy. RECHARGE's unique membership covers all aspects of the advanced rechargeable battery value chain in Europe: from suppliers of primary and secondary raw materials, to battery, equipment and original equipment manufacturers (OEMs), to logistic partners and battery recyclers. www.rechargebatteries.org
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