

Introduction

- “the initiative will modify the Directive or a proposal for a new Regulation repealing the Directive will be prepared, to notably encompass end-of-life and sustainability requirements. (... Q4 2020)” 2020 CWP
- Information from
 - Studies and consultation underpinning the assessment and evaluation of the Directive,
 - Studies and consultation carried out in the context of the ‘eco-design’ process,
 - Extensive consultation processes during and following up to the Strategic Action Plan on Batteries,
 - Two specific studies,
 - *Feasibility of measures addressing shortcomings in the current EU batteries framework system,*
 - *Study addressing particular topics on batteries (legal statuses, restrictions, etc).*

Proposed approaches and measures

- Taken from
 - EU institutions
 - Stakeholders' proposals
 - Technical and scientific publications
- Disclaimer

This document is part of a study which is being prepared for the European Commission. However, the information and views set out in this report are those of the authors and do not necessarily reflect the official opinion of the Commission. The Commission does not guarantee the accuracy of the data included in this initial presentation of results.

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Batteries Directive 2006/66/EC

Initial results of the study in support of the assessment of the Batteries Directive

Measure 8: Problems to establish end-of-recycling criteria



RECYCLING

Measure 8

Problems to establish end-of-recycling criteria

RECYCLING

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Measure 8 – Problems to establish end-of-recycling criteria (I)

Problem description

- What is considered or not as part of recycling is handled differently between MS.
- In some MS the recycling output slag is counted as part of recycling, while in others it is not.
- Thus, dealing differently with slag seems to hamper the development of a level playing field for recyclers.
- The same applies to other output materials e.g. black mass.
- Reporting of slags and other materials (e.g. black mass) and thus calculation of recycling efficiency is not consistent and not harmonized in the EU.
- Metals contained in slags are e.g. lithium, manganese, and aluminum.

Measure 8 – Problems to establish end-of-recycling criteria (II)

Baseline

No harmonized rules in EU for accounting of slags and black mass.

Regulation (EU) No 493/2012:

The mass of output fractions accounting for recycling is the mass, on a dry weight basis, of the elements or compounds contained in fractions resulting from the recycling of waste batteries and accumulators per calendar year [in tonnes]. The following may be, inter alia, accounted for output fractions:

[...]

*— battery and accumulator materials contained in slag suitable and used for recycling purposes as defined in Article 3(8) of Directive 2006/66/EC **other than landfill construction or backfilling operations, provided that this is in line with national requirements.***

Article 3(8) of Directive 2006/66/EC

‘recycling’ means the reprocessing in a production process of waste materials for their original purpose or for other purposes, but excluding energy recovery;

Measure 8 – Problems to establish end-of-recycling criteria (IIIa)

Alternative options

Option 1: EU-wide harmonized rules on what is accounted for recycling

- Slags, black mass and potential other material mixtures are considered in this option.
- Only high-quality recycling is accounted for recycling. Therefore the entire recycling chain up to the last recycling step has to be monitored.
- Down-cycling, e.g. use of slags for road construction, is not accounted.
- It has to be clarified, which applications could be accounted for or not, e.g. cement additives.
- Slag forming agents have to be included in the input calculation as they become part of the slag.
- If these points are clarified no change of current calculation method for recycling efficiency is necessary.

Measure 8 – Problems to establish end-of-recycling criteria (IIIb)

Alternative options

Option 2: Slags etc. are not accounted, only the metals contained in slags etc.

- Slags, black mass and potential other material mixtures are considered in this option.
- Only the metal content is calculated.
- Metals are calculated in “metal equivalents”, so that it is clear that the target of recycling could also be metal compounds.
- Recycling efficiency target values need to be adjusted: Metal content is significantly lower than total amounts of slags or black mass which are currently taken into account when calculating the recycling efficiency → Overestimation of recycling efficiency
- Auditing of the recovery rates of the recovered metals is required up to the last recycling step.

Measure 8 – Problems to establish end-of-recycling criteria (IVa)

Assessment of initial results

Option 1: EU-wide harmonized rules on what is accounted for recycling

- Criteria when slags should be accounted for recycling:
 - Only slags, black mass etc. where metals (respectively metal compounds) are recovered from should be taken into account.
 - Metals have to be refined to „battery grade“ or be used in other high-quality applications.
 - Use of slags in applications, which are no high-quality recycling, e.g. use in cement or in road coatings, filling salt mines etc., shall not be accounted as recycling (no down-cycling allowed).
 - Slag forming agents have to be included in the input calculation.
 - Criteria need to be harmonized with end-of-waste criteria for slags.
- Processing of slags and recovery of Lithium might take place in a separate recycling facility. Processing of slags in a subsequent step/facility needs to be monitored and audited.
- Total environmental effects of option 1 should be investigated in a detailed LCA study.
- Other recycling processes, not being high-quality recycling, could still be communicated but would not account for recycling.

Measure 8 – Problems to establish end-of-recycling criteria (IVb)

Assessment of initial results

Option 2: Slags etc. are not accounted, only the contained metals

- If targets for material recovery rates for specific materials are implemented (see *measure on recycling efficiencies and material recovery rates*) environmental benefits are expected.
- Processes to extract lithium from slags are established. For this process positive environmental effects are expected.
- Recovering of manganese or aluminum from slags would be very complex and therefore associated with very high costs and high environmental burdens.
- Recycling of Li-ion batteries: 347 kg slag output (per 1000 kg input) → only about 10 kg Li contained in the slag.
 - Amount of recovered metals from slags: Li accounts for only about 1% or less.
 - Li is thus not relevant for the total recycling efficiency if only the metal content is taken into account.
- If no longer the total amount of slags but only the metal content accounted for recycling the calculation of the recycling efficiency would lead to much lower results. Therefore, an adaption of the recycling efficiencies to a lower target value would be necessary.
- Total environmental effects of option 2 should be investigated in a detailed LCA study. ⁹

Measure 8 – Problems to establish end-of-recycling criteria (Va)

Initial conclusions

Option 1 and 2

- Both options develop clearer rules on what can and cannot be accounted for as recycling and thus support the development of a level playing field for recyclers.
- Avoiding downcycling; overall higher recycling standards are expected.
- Auditing of the entire recycling chain and the recovery rates is required up to the last recycling step.
- Environmental effects should be investigated in a detailed LCA study.
- The difference between the two options is supposed to be rather small: In both cases it is assumed that high-quality metals or metal compounds are recovered from the slag/black mass. In option 1, calculation is based on kg slag/black mass, in option 2 it is based on kg metal equivalent.

Measure 8 – Problems to establish end-of-recycling criteria (Vb)

Initial conclusions (continued)

Option 1:

- Could be implemented in the short term (standards for high-quality recycling still need to be developed and agreed on)
- No change of the current calculation methodology of the recycling efficiency is needed.
- Taking into account the entire mass of slags / black masses makes a comparison of recycling efficiencies of different processes still difficult. Although, data is more consistent and better harmonized than in the baseline.

Option 2:

- Implementation is expected to be a longer process.
- An adaption of the recycling efficiencies will be necessary (slags would no longer account for recycling but only the metals recovered) and new target values would have to be defined.
- Taking into account only the metal content allows a direct comparison of recycling efficiencies of different processes and results in better harmonized and consistent data (compared to option 1 and baseline).