EUROBAT
ASSOCIATION OF EUROPEAN AUTOMOTIVE AND INDUSTRIAL BATTERIES MANUFACTURERS

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EUROBAT feedback on the JRC's 2nd draft technical report on the CF of industrial batteries.

EUROBAT thanks the JRC for the opportunity to comment on the second draft Report Methodology for the calculation and verification of the carbon footprint (CF) of rechargeable industrial batteries with a capacity above 2 kWh, excluding those with exclusively external storage.

Several elements of the draft methodology need to be amended to ensure that the final methodology can be applied in practice and properly reflects the climate footprint and benefits of industrial batteries.

Critically, manufacturers of automotive and industrial batteries call on the Commission to base the calculation of the functional unit (FU) of the off-the-shelf (OTS) batteries on the durability and performance parameters referred to in Art. 10 of the Batteries Regulation. For custom-made (CM) batteries that value should be based on a Technical Purchasing Specification (TPS) including the requested application life, with a commitment from the battery manufacturer to fulfil this TPS materialized by an Auditable Sizing Report (ASR).

EUROBAT recommendations for methodology to calculate and verify the CF of industrial batteries.

- The "years of operation" value of the FU should be determined according to the battery's technical specifications and actual service life, rather than on the commercial warranty. For OTS batteries, the self-declared service life should be based on the document containing the values for the electrochemical performance and durability parameters set out in Annex IV of the Batteries Regulation. For CM batteries, that number should be based on a Technical Purchasing Specification (TPS) including the requested application life with a commitment from the battery manufacturer to fulfil this TPS materialized by an Auditable Sizing Report (ASR).
- For REP batteries, the FeQC number should lowered towards 230.
- Any component playing a role in the safety and reliability of the battery should be included in the system boundaries, including cooling and fire suppression systems.
- The return rate (*RReturn*) of mobile batteries should the same as that of stationary batteries (95%).
- The carbon footprint formula (CFF) – specifically the default recycling model – must better reflect

1- Functional Unit – Amending Section 2: the warranty is not an acceptable metric to determine the battery' service life – EUROBAT proposal

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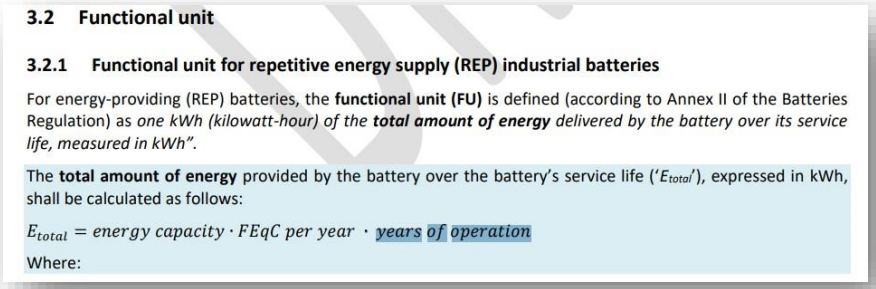


3.2 Functional unit

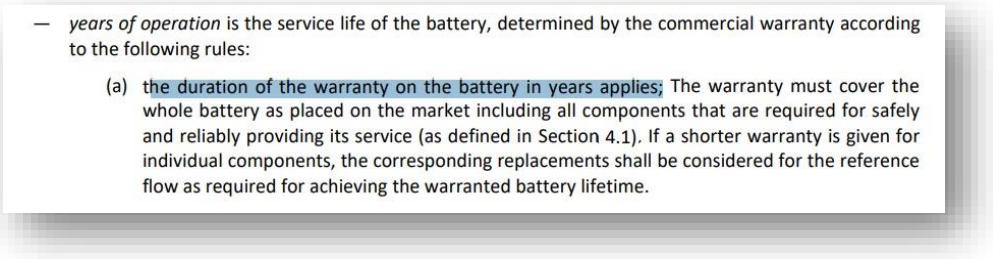
3.2.1 Functional unit for repetitive energy supply (REP) industrial batteries

For energy-providing (REP) batteries, the **functional unit (FU)** is defined (according to Annex II of the Batteries Regulation) as *one kWh (kilowatt-hour) of the **total amount of energy** delivered by the battery over its service life, measured in kWh".*

The **total amount of energy** provided by the battery over the battery's service life ('E_{total}'), expressed in kWh, shall be calculated as follows:

$$E_{total} = energy\ capacity \cdot FEqC\ per\ year \cdot years\ of\ operation$$

Where:



— *years of operation* is the service life of the battery, determined by the commercial warranty according to the following rules:

(a) the duration of the warranty on the battery in years applies; The warranty must cover the whole battery as placed on the market including all components that are required for safely and reliably providing its service (as defined in Section 4.1). If a shorter warranty is given for individual components, the corresponding replacements shall be considered for the reference flow as required for achieving the warranted battery lifetime.

The draft methodology would base the calculation of the FU on the commercial warranty, as the total amount of energy would be a function of the years of operation of a battery. In turn, the "years of operation" variable would be determined according to the "duration of the warranty of the battery in years".

This approach departs from the first draft Report (June 2023), where the FU was either based on the "manufacturer declares" approach or on standard-based approaches, none of which were based on the commercial warranty. Normalising everything around the commercial warranty would lead to biased CF calculations as the warranty does not relate to the actual service life of the product.

Indeed, the warranty is a marketing instrument, marking the timeframe during which the customer can leverage legal rights for replacement against the supplier. The commercial warranty is often much shorter than the actual service life of a battery and varies from one company to the other all this being equal regarding the technical specifications of the battery model.

1.A EUROBAT proposal for the FU – replacing the commercial warranty and adjusting the FeQC value

We believe that the determination of both the Etotal and the Power BU is different when the battery is sold to the customer without knowing its application ("off the shelf" – OTS) or when the battery manufacturer receives the Technical Purchasing Specifications from its customer and when the custom-made (CM) battery is specifically designed for this application. For OTS batteries, a self-declaration based on Art. 10 would be the most appropriate; for CM batteries, the years of operation value should be based on a Technical Purchasing Specification (TPS) that would include the requested application life, as specified bellow.

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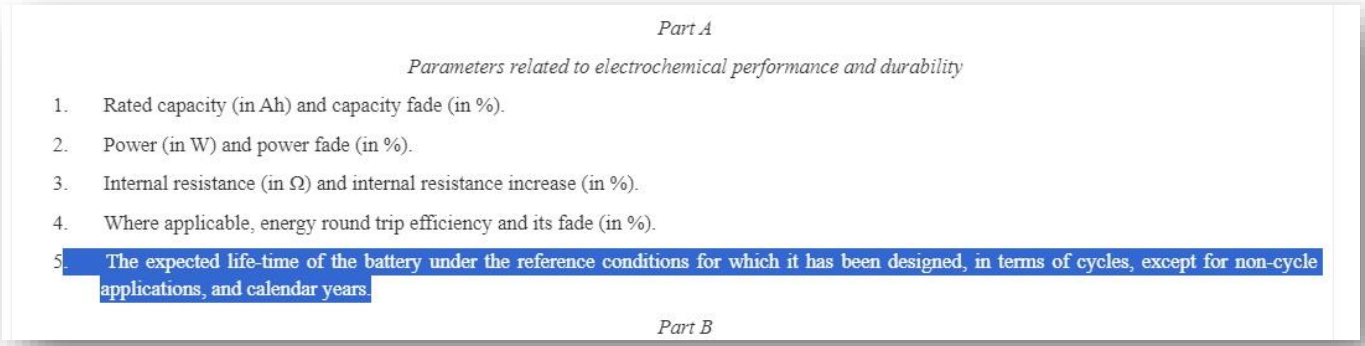
1.A.1 - Off-the-shelf batteries

For the OTS batteries, the "years of operation" value should be based on a self-declared service life, both for repetitive energy supply (REP) batteries and for on-demand (OND) or back-up supply batteries. The self-declared service life should be based on the document containing the values for the electrochemical performance and durability parameters set out in Annex IV of the Batteries Regulation, specifically the expected lifetime of the battery (Point 5 of Part A of Annex IV), coupled with the technical documentation explaining the technical specifications, standards and conditions used to measure, calculate or estimate the values for the electrochemical performance and durability parameters, under Annex VIII.



Part A

Parameters related to electrochemical performance and durability

1. Rated capacity (in Ah) and capacity fade (in %).
2. Power (in W) and power fade (in %).
3. Internal resistance (in Ω) and internal resistance increase (in %).
4. Where applicable, energy round trip efficiency and its fade (in %).
5. The expected life-time of the battery under the reference conditions for which it has been designed, in terms of cycles, except for non-cycle applications, and calendar years.

Part B

From 18 August 2024, the above-mentioned document and technical documentation must accompany rechargeable industrial batteries, LMT batteries and traction batteries placed on the EU market (Art. 10(1)). This documentation will contain all the details about how long the battery can last, links to the specific applications and to the specific standards or internal procedures used to evaluate the service life. At some point in time the certification body will be required to check all the data, and the supporting documentation will be developed according to the know-how of each company and technology and application.

Also, the FeQC number should be set towards 230 cycles/year: indeed, in industrial environments, batteries typically work 5 days a week. When maintenance periods are taken into account, the typical number of cycles/years would be close 230, in any case much lower than 365.

Accordingly, for **OTS batteries which are repetitive energy supplies (REP) batteries**, the functional unit (FU) is defined (according to Annex II of the Batteries Regulation) as:

"one kWh (kilowatt-hour) of the total amount of energy delivered by the battery over its service life, measured in kWh".

The total amount of energy provided by the battery over the battery's service life ('*Etotal*'), expressed in kWh, shall be calculated as follows:

$$Etotal = energy\ capacity \cdot FEqC\ per\ year \cdot years\ of\ operation$$

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Where

- *energy capacity* is the useable energy capacity of the battery in kWh at the beginning of life, namely the energy available to the user when discharging a new fully charged battery until the discharge limit set by the battery management system.
- *FEqC* per year is the typical number of full equivalent charge-discharge cycles per year and equals 230 for all REP-type IND batteries
- *Years of operation* is the service life of the battery, determined by the expected life-time of the battery under the reference conditions for which it has been designed in cycles; as reported under the document that must accompany the battery when placed on the market according to Article 10(1) of the Batteries Regulation.

For OTS batteries that are on-demand (OND) or back-up batteries, the functional unit for the CFB of OND batteries is defined as:

"Provision of 1 kWmin of backup power capability ***supplied within the requested load profile****, over the whole service life. Provision of backup power refers to the ability to discharge at the given power without interruption at continuous discharge above minimum voltage at any time."*

The backup power capability provided by the battery over its service life ('*PBU*'), expressed in kWmin, shall be calculated as follows:

$$PBU = backup\ power\ capability \cdot years\ of\ operation * 3\ (*)$$

Where

- *backup power capability* is determined by the rated power capability of the battery in kW (Pr) and its stored energy time (Tse) in minutes, available over the whole service life. Stored energy time (Tse) refers; to the time (in minutes) the battery is able to provide power at Pr above the specified minimum voltage according to IEC 62040-3. It is equivalent to the useable energy capacity [kWh] / rated power [kW] * 60.
- *Years of operation* is the service life of the battery, determined by the expected life-time of the battery under the reference conditions for which it has been designed in calendar years; as reported under the document that must accompany the battery when placed on the market according to Article 10(1) of the Batteries Regulation.

(*): In order to ensure the PBU value is a better representation of the true use, delivering three back-up services per year rather than one should be preferred. Hence the multiplication factor of 3 suggested above.

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1.A.2 Custom-made batteries

For **customised batteries which are repetitive energy supply (REP) batteries**, the functional unit (FU) is defined (according to Annex II of the Batteries Regulation) as:

"one kWh (kilowatt-hour) of the total amount of energy delivered by the battery over its service life, measured in kWh".

The total amount of energy provided by the battery over the battery's service life ('*Etotal*'), expressed in kWh, shall be calculated as follows:

$$Etotal = energy\ capacity * FEqC\ per\ year\ * Years\ of\ operation$$

Where:

- *Etotal* is the total amount of energy that the selected CM battery will be capable of delivering for the customer use case, over the requested application life,
- *years of operation* is the requested application life,
- The customer use case shall be materialized by a Technical Purchasing Specification (TPS), which may include several use profiles (and related cycles) and a requested application life,
- The manufacturer shall commit to fulfill the TPS. This commitment shall be materialized by an Auditable Sizing Report (ASR), which shall identify:
  - the customer requested use case and relevant operating conditions,
  - the selected battery system,
  - the number of batteries systems supplied in sequence,
  - along with their cumulated battery service life which shall be equal or greater than the requested application life,
  - the *Etotal* delivered to the customer in his use case, over the requested application life.
- The ASR shall be part of the sales offer.

For **back-up customized batteries (OND),** the functional unit for the CFB of OND batteries is defined as: *"Provision of 1 kWmin of backup power capability* ***supplied within the requested load profile****, over the whole service life. Provision of backup power refers to the ability to discharge at the given power without*

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interruption at continuous discharge above minimum voltage at any time."

The backup power capability provided by the battery over its service life ('*PBU*'), expressed in kWmin, shall be calculated as follows:

$PBU = backup\ power\ capability * years\ of\ operation * 3$ (*)

Where :

- *backup power capability* is the total amount of energy in kW*min that the selected CM battery will be capable of delivering for the customer requested load profile,
- *years of operation* is the requested application life (alternatively the requested battery life),
- The customer requested load profile shall be materialized by a Technical Purchasing Specification (TPS), which may include several individual load profiles and temperature conditions, and which includes a requested application life,
- The manufacturer shall commit to fulfill the TPS. This commitment shall be materialized by an Auditable Sizing Report (ASR), which shall identify:
  - the customer requested load profile and relevant operating conditions,
  - the most stringent individual load profile,
  - the selected battery system,
  - the number of batteries systems supplied in sequence,
  - along with their cumulated battery service life which shall be equal or greater than the requested application life (alternatively, the battery service life which shall be greater or equal to the requested battery life)
- The ASR shall be part of the sales offer.

(*): In order to ensure the PBU value is a better representation of the true use, delivering three back-up services per year rather than one should be preferred. Hence the multiplication factor of 3 suggested above.

1.B Aligning the functional unit of industrial batteries with that of EV Batteries: why this should be opposed:

During the July 8th workshop, JRC representatives justified the decision to base the calculation of the functional unit on the warranty by the need to align the draft methodology for calculating the CF of industrial batteries with that of EV traction batteries.

Commercial warranties delivered from the automotive OEM to the customer often align with the actual

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service life of the EV traction batteries, which tends to approximate 10 years.

Conversely, warranty systems are often underdeveloped for industrial batteries. When warranties are available, they are much more like to depart widely from the actual service life of the battery than EV batteries. Relations between manufacturers and downstream users of industrial batteries are most often "business-to-business" relations, where contracts – for example based on the financial loss incurred in case of a default with the battery – usually prevail in place of a warranty – the latter being most often privileged for business-to-consumer relations.

Even in the case of EVs, warranty models come in different formats, based on the performance and use formats of the battery.

A customer may select a different warranty for the same product because the usage of the battery would be completely different, with none of the warranties suiting the actual performance specifications of the battery, as laid down in the technical data sheets. The warranty is a legal instrument for claims, meant to regulate compensations in case of product damage or insufficient performance of the battery. The warranty does not properly reflect the performance according to the Batteries Regulation.

1.C The current lack of standards on the performance and durability of lithium-ion batteries is not a good reason not to base the functional unit on Article 10

During the 8 July 2024 workshop, JRC representatives argued that connections with Article 10 could not be established for the FU since the standards to be developed under standardization request M579 on the performance and durability of batteries would not be finalised in time.

This is not a valid argument: the standards to be developed under standardization request M579 are not expected to be granular enough to cover all niche applications of industrial batteries. For many applications, manufacturers would have no choice but to default back on the documentation provided under Art. 10 for a certain number of CF declarations.

Conclusion:

It is not appropriate to cover all types of industrial batteries with one formula and/or one methodology to determine the FU, even less so than for EV batteries, given the wide range of applications for industrial batteries. Hence our proposal to base the service life on the documentation shared by the manufacturer under Art. 10 for OTS batteries or a Technical Purchasing Specification (TPS) for CM batteries. Please refer to the 2035 EUROBAT Roadmap for more information on the different categories of rechargeable industrial batteries and the sectors in which they are used.

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On a separate note, we would like the JRC to clarify its note on lines 209-210, as it could impact the decision to allocate a battery to either REP or OND or back-up. The current is not clear in our view[1].

2- Chapter 4: System Boundaries

2.a For a strict inclusion of everything that is needed for the safe and reliable operation of the battery (Section 4.1)

During the July workshop, Volkswagen recommended taking system installations (e.g. fire suppression system) as well as cooling systems out of the system boundaries. According to Volkswagen, these components are not intrinsic to the battery's function as a power storage device and should be excluded from the CF calculation.

EUROBAT strongly objects to Volkswagen's proposal and calls on the JRC to maintain and expand the wording in lines 241-243:

241 If components that are essential for the safe and reliable operation of the battery are incorporated in external
242 devices such as a charger, PCS, or are part of the application, then these components shall be included in the
243 system boundaries and accounted for in the CFB calculation. Similarly, if a battery is installed in an existing
244 premise and substantial modifications are needed for ensuring the battery's safe and reliable operation (such as
245 a retrofitting of the existing fire extinguishing system or an additional containment), these components fall within
246 the system boundaries.

The Batteries Regulation defines a battery as an entity delivering energy in a safe and reliable way: any component helping to fulfill safety-related functions for the battery is important and should be within the system boundaries. For lithium-ion batteries in particular, there should be no incentive to lower the CF of a battery by cutting down on the safety system. The safety system part of a battery pack is part of the battery, and therefore in the scope of the CF calculation. The Battery Thermal Management System (BTMS) allows also a reliable and longer life of the battery system, the BTMS and cooling system are also part of the system boundary.

Recharge and EUROBAT are working on a position paper with practical examples of what is a battery, who is manufacturer, where battery manufacturing stops and where the OEM starts. The document, to be sent to the JRC in the coming weeks, should inform the proper definition of system boundaries.

3- Chapter 6.3: Inventory data – modelling requirements – Recycling content and end-of-life modelling

3.a Aligning the return rate (*RReturn*) of mobile batteries with that of stationary batteries (95%)

[1] NOTE: If the battery has to provide backup service very frequently so that a cycle limitation has to be added to the warranty, it ceases to be Backup battery and should better be declared REP.

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EUROBAT opposes assigning a fixed return rate of 80% for mobile batteries for the *RReturn* variable: that number should be aligned with that of mobile batteries (95%)

During the July workshop, JRC representatives signalled that they had in mind portable batteries when applying that return rate, or even EV batteries, which are often exported to third countries and whose tracks are often lost. The same cannot posited for mobile waste industrial batteries (e.g. railway or airplane batteries, forklift batteries) which do not incur the same rate of "disappearance. The take-back systems implemented by our member company Saft had not shown any gaps in return rates between mobile and stationary industrial batteries.

In any case, the JRC should disclose the evidence (e.g. studies, reports, statistics…) used to justify this difference in the *RReturn* value.

3.c Reflecting the specificities of each battery chemistry in the default recycling model – more data needed for nickel-cadmium and lead-based batteries

The merging of Ni-Cd and Li-ion batteries for the default recycling model (Table 5) should be opposed: as Ni-Cd batteries are not recycled with Li-ion-specific processes.

The lack of lead-specific data for Table 6 (default recycling model for recycling of PbA battery cells) is also concerning.

More generally, additional industry consultations are needed to ensure that the methodology reflects the wide range of battery chemistries used for industrial batteries, in particular as regards the scope of the system boundaries and the CFF formula (Chapters 4.2 and 6.3.1). The 2nd draft technical report presents too much copy-paste from the EV batteries methodology, disregarding the fact that industrial batteries are much more diverse with regards to the chemistries they rely on and the applications they serve (EV traction batteries only as li-ion batteries as yet).

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About EUROBAT

EUROBAT is the association for the European manufacturers automotive, industrial and energy storage batteries. EUROBAT has more than 50 members from across the continent comprising more than 90% of theautomotive and industrial battery industry in Europe. The members and staff work with all stakeholders, such as battery users, governmental organisations and media, to develop new battery solutions in areas of hybrid and electro-mobility as well as grid flexibility and renewable energy storage.