Battery Pass

FAST FACTS CONTENT GUIDANCE

Battery Passport Content Guidance

Achieving compliance with the EU Battery Regulation and increasing sustainability and circularity

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Further reading:

Battery Passport Content Guidance and supporting documents

QUESTION 1

What is a digital battery passport and from when will it be required?

The EU is introducing digital product passports (DPP) as part of its broader regulatory ambition towards sustainability with the first being required for batteries from 2027.

DPPs are included in the EU's new Eco-design for Sustainable Products Regulation (ESPR), which entered into force in July 2024. These passports are digital records of a product that collect data along its entire lifecycle.

The information held in a DPP helps manufacturing and end-of-life processes to be more sustainable and circular. It also supports consumers in making informed choices. DPPs are key to advancing the European 'Twin Transition,' aiming for a more sustainable, circular, and digital economy.

The battery passport is the first DPP to be introduced in Europe and will be a detailed digital record of a battery's materials, components, and lifecycle. This requirement comes from the EU Battery Regulation and will be mandatory starting in February 2027.

The battery passport will be the first of a series of digital product passports to be launched in the European Union

Objectives of DPPs

Provide transparency to impact decisions

Shift from linear to circular economies

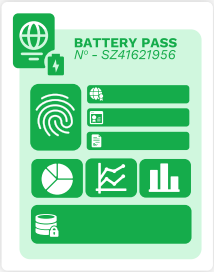
Create a level playing field

DPPs in the ESPR

The Eco-design for Sustainable Products Regulation (ESPR) includes the requirement that **„products can only be placed on the market or put into service if a digital product passport is available“.**

The Digital Battery Passport

Article 77 of the EU Battery Regulation mandates for batteries an **„electronic record (battery passport)“** from 18 February 2027.



QUESTION 2

For which batteries will the digital battery passport be required?

The EU Battery Regulation outlines its requirements for different battery categories.

According to Article 77(1), the battery passport will be mandatory from February 2027 for batteries placed or put into service on the EU market including:

- Electric vehicle (EV) batteries.
- Light means of transport (LMT) batteries, such as e-bikes and e-scooters.
- Industrial batteries with a capacity above 2 kWh, such as those used in industrial activities, communication infrastructure or energy storage.

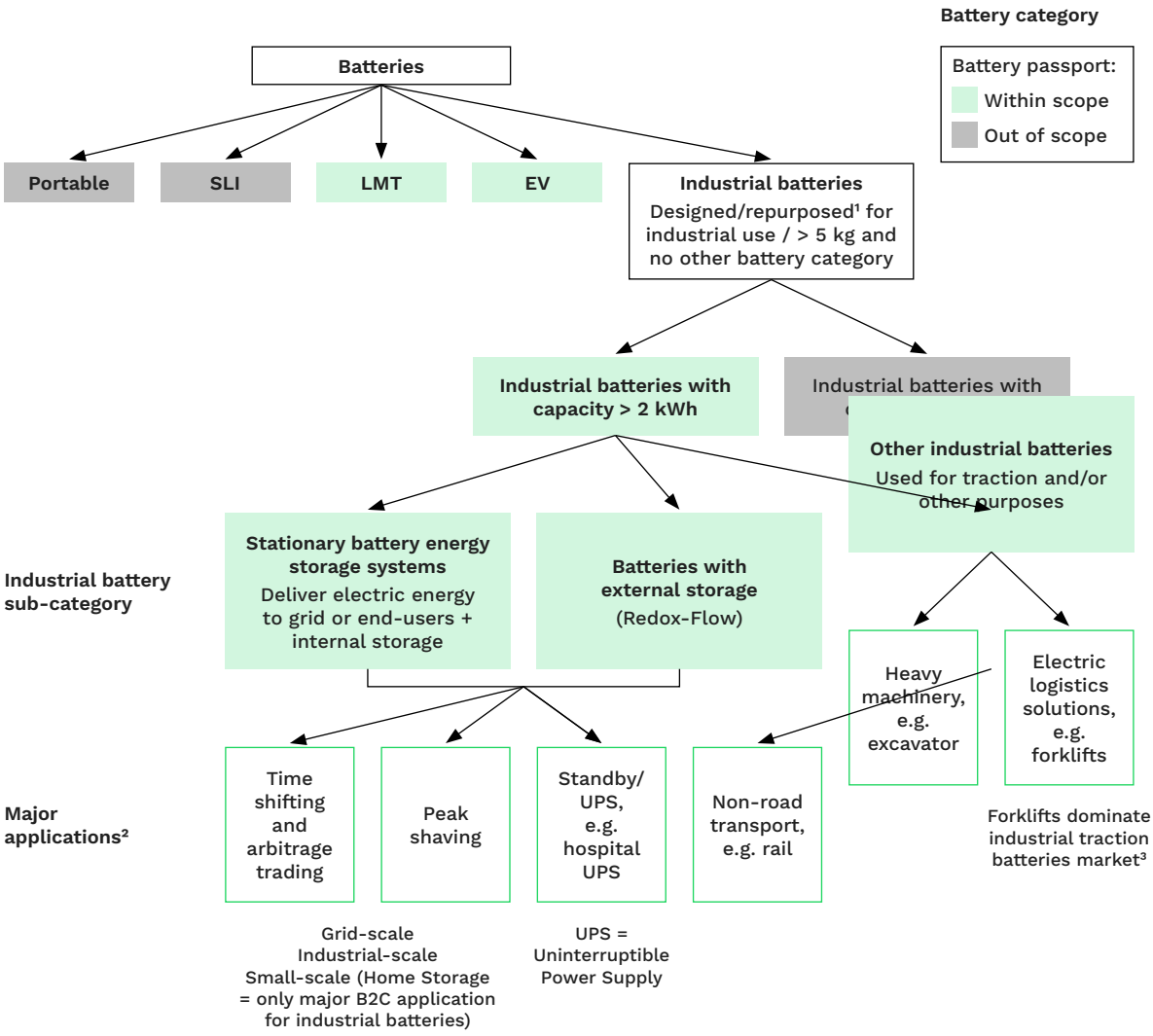
Further details on how the Battery Regulation defines different batteries are shown on the back.

Electric vehicle, light means of transport, and industrial batteries with a capacity above 2 kWh will be in scope for the EU battery passport

Battery categories	Battery categories	Battery weight
Electric vehicle (EV) battery	Provide electric power for the traction to hybrid or electric vehicles • of categories L (Regulation (EU) No 168/2013), if larger than 25 kg, or • of categories M, N or O (Regulation (EU) 2018/858)	> 25 kg (category L)
Light means of transport (LMT) battery	Provide electric power for traction to wheeled vehicles that can be powered by the electric motor alone or by a combination of motor and human power including type-approved vehicles of category L (Regulation (EU) No 168/2013), e.g., e-bikes and e-scooters	≤ 25 kg
Industrial battery[1]	• Designed specifically for industrial uses, or • intended for industrial uses after being subject to preparing for repurpose or repurposing, or • any battery above 5 kg that is not an LMT, EV or SLI battery • Industrial uses include (Recital 15) – industrial activities – communication infrastructure – agricultural activities – energy storage in private or domestic environments – generation and distribution of electric energy – traction in other transport vehicles incl. rail, waterborne, aviation or off-road machinery Sub-category: **Stationary battery energy storage system** • Industrial battery with internal storage • specifically designed to store and deliver electric energy from and into the grid or store and deliver electric energy to end-users, regardless of where and by whom this battery is being used	≤ 25 kg

1) Only industrial batteries above 2 kWh within scope of battery passport

Industrial batteries are characterised in different sub-categories and a broad range of applications, with varying market conditions and processes affecting the use cases



1) A number of industrial batteries may be repurposed batteries (e.g. a former EV battery is repurposed into an industrial battery). However, repurposing used industrial batteries is a less likely scenario.
2) Market conditions and processes (e.g. servicing processes) can vary among industrial batteries applications, resulting in an impact on the applicability of the overall use case assessment.
3) cf. Global Market Insights Report (2023)

Overview of the hierarchy of battery definitions

Battery

Pack Module Cell

Major general characteristics	Grouping of batteries based on production
Battery category Discern different use categories (e.g., EV, industrial...)	**Battery model** All batches and individual batteries within a model share the same technical characteristics
Battery chemistry Active materials in anode, cathode, and electrolyte	**Battery batch** · **Battery batch** · **Battery batch** Consistently manufactured group of batteries within a model, identifiable by a batch identification code
Internal vs. external storage Energy stored within the battery or in one or more external devices (e.g., redox flow)	
Rechargeable vs non-rechargeable (Not) designed to be electrically recharged	**Particular / individual batteries** Singular battery, identifiable by product serial number with an individual use phase

QUESTION 3

Who is responsible for the digital battery passport, and when do they need to take action?

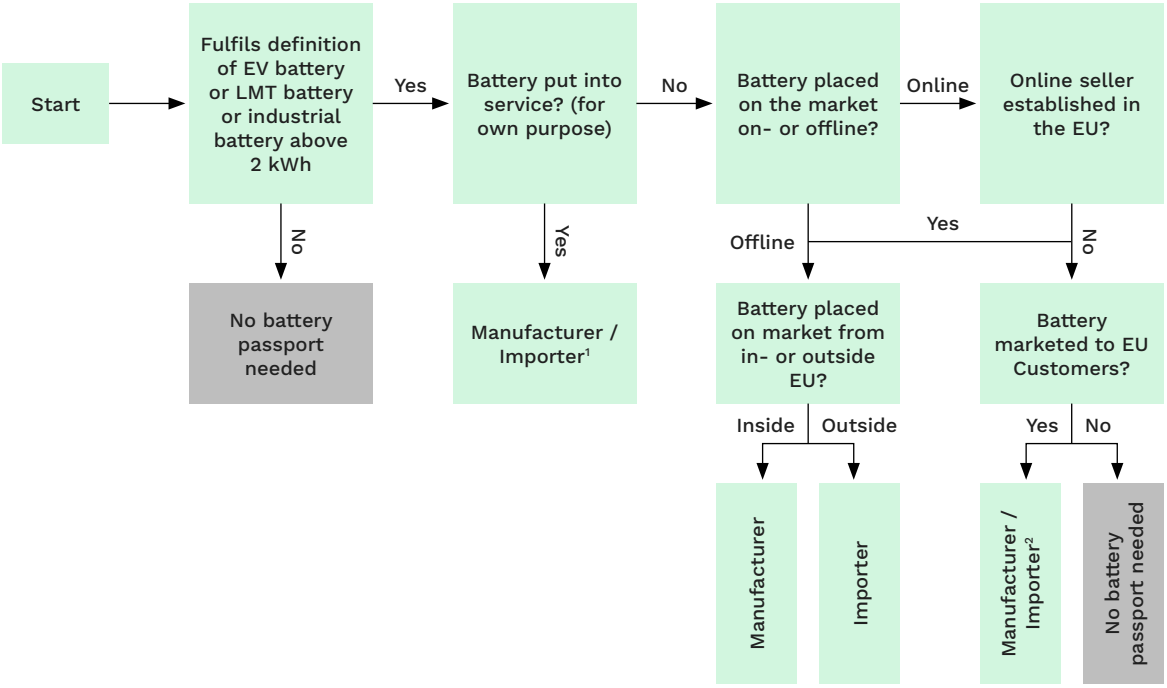
The economic operator who places the battery on the market or puts it into service is responsible for meeting the battery passport requirements. This can be either the manufacturer or the importer.

The term ‘manufacturer’ refers to any natural or legal person that manufactures a battery or has a battery designed or manufactured and markets that battery under its own name or trademark or puts it into service for its own purposes. The ‘importer’ is established within the EU and places a battery on the market from a third country. The economic operator is explicitly allowed to authorise another operator “to act on their behalf”.

For example, if an EU-based car manufacturer buys battery cells and assembles them into an electric vehicle battery, they are considered the manufacturer and thus the economic operator responsible for the battery passport.

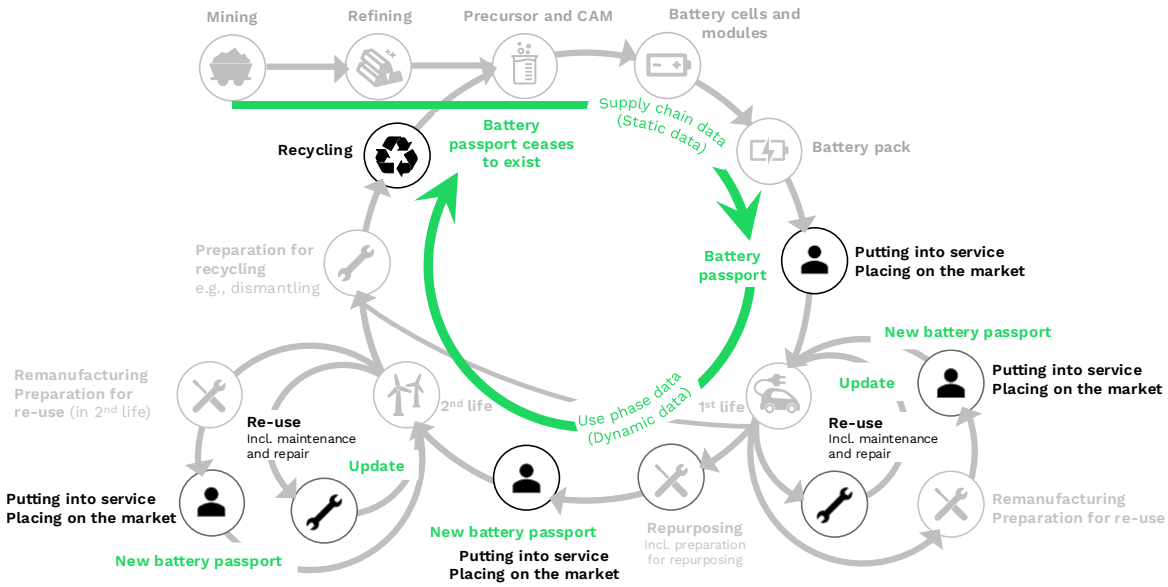
The main responsibilities for the battery passport include creating a new battery passport, as well as updating and storing the information within it.

Either the “manufacturer” or “importer” are responsible for the battery passport



1) Battery Pass understanding, not clearly defined in Battery Regulation
2) Depending on who is targeting EU consumers

Core responsibilities for the battery passport comprise the issuing of a (new) battery passport as well as updating and storing the information



1) Treatment of manufacturing and processing waste as well as collection and transport can occur between all activities within the value chain

QUESTION 4

Which information will be requested for the battery passport and who will have access to it?

The EU Battery Regulation requires a wide range of data attributes to be included in the battery passport. For EV batteries alone, Article 77 and Annex XIII outline around 80 mandatory data attributes covering the entire battery lifecycle.

The Battery Pass consortium has organised the data attributes into seven content clusters along the battery life cycle:

1. General battery and manufacturer information
2. Compliance, labels, certifications
3. Battery carbon footprint
4. Supply chain due diligence
5. Battery materials and composition
6. Circularity and resource efficiency
7. Performance and durability

The data attributes can be related to the battery model or specific to the individual battery. For the technical implementation, they can also be differentiated by as “static” (unchanging or not changing often) or “dynamic” (changing often over time).

In addition, data is differentiated by the actors who can access it, allowing data confidentiality. For this purpose different groups are defined for restricted data access:

- the “general public”
- “notified bodies, market surveillance authorities and the [European] Commission”
- “any natural or legal person with a legitimate interest”. Particularly the last category will be specified further by the European Commission through an Implementing Act due latest by August 2026.

You can find a detailed overview of the information held in the battery passport by battery categories and access groups below. Please note that this overview has been updated to reflect the names and characteristics of the data attributes as included in the DIN DKE Spec 99100 (to be published in Autumn 2024), and therefore differs from Figure 13 shown in the Battery Passport Content Guidance (p.61).

Battery passport information by battery categories and access groups

Access groups:

- Public
- Persons with a legitimate interest
- Notified bodies, market surveillance authorities
- Persons with a legitimate interest and Commission

Battery categories:

- All batteries below
- EV batteries (if BMS is used[1])
- LMT batteries (if BMS is used[1])
- Industrial batteries incl. stationary energy storage systems[2] > 2 kWh
- Stationary battery energy storage systems > 2 kWh

Static Data

Topic Identifiers and product data	Subtopic (if applicable)
Battery passport identifier (recommended)	Date of putting battery into service (where appropriate)
Battery identifier	Warranty period of the battery
Operator identifier and information (recommended)	Battery Warranty period of the battery
Manufacturer identifier and information	Battery mass
Manufacturing place	Battery status
Manufacturing date	
Symbols, labels and documentation of conformity	
Separate collection symbol	Meaning of labels and symbols
Symbols for cadmium and lead	EU declaration of conformity
Carbon footprint label	Results of test reports proving compliance
Extinguishing agent	

Topic		Subtopic (if applicable)
Battery carbon footprint		
Overall battery carbon footprint per functional unit	Carbon footprint of distribution lifecycle stage	
Carbon footprint of raw material acquisition and pre-processing lifecycle stage	Web link to public carbon footprint study	
Carbon footprint of main product production / manufacturing lifecycle stage	General battery and manufacturer information	
Carbon footprint performance class	Absolute battery carbon footprint (recommended)	
Supply chain due diligence		
Information of due diligence report	Supply chain indices (recommended)	
Third-party assurances of recognised schemes (recommended)		
Battery materials and composition		
Battery chemistry	Hazardous substances	
Critical raw materials	Impact of substances on environment, human health, safety, persons	
Materials used in cathode, anode and electrolyte		
Circularity and resource efficiency		
Dismantling information: Manuals for the removal and the disassembly of the battery pack	E-mail address of sources for spare parts	Circularity information
Part numbers for components	Web address of sources for spare parts	
Postal address of sources for spare parts	Safety measures	
Pre-consumer recycled content share of Ni/Co/Li/Pb	Post-consumer recycled content share of Ni/Co/Li/Pb	Recycled & renewable content
Renewable content share		
Information on the role of end-users in contributing to waste prevention	Information on the separate collection, the take back, collection points and preparation for re-use, preparation for repurposing and treatment available for waste batteries	Role of end-user in waste prevention and collection
Information on the role of end-users in contributing to separate collection of waste batteries		
Performance & Durability		
Rated capacity	Remaining capacity	Capacity, energy and voltage
Capacity fade	Remaining usable battery energy (recommended)	
Certified usable battery energy (recommended)	State of certified energy (SOCE)	
Minimal, nominal and maximum voltage, with temperature ranges when relevant	State of charge (SoC)	

Static Data

Dynamic Data

Topic Performance & Durability (cont'd)		Subtopic (if applicable)
Static Data	Dynamic Data	
Original power capability Power fade Maximum permitted battery power Ratio between nominal battery power and battery energy (recommended)	Where possible, remaining power capability	Power Capability
Initial round trip energy efficiency Where applicable, round trip energy efficiency fade Round trip energy efficiency at 50% of cycle life Initial self-discharge rate	Where possible, remaining round trip energy efficiency Current self-discharge rate Evolution of self-discharge rate (recommended)	Energy round trip efficiency, Self-discharge
Internal battery resistance (cell & pack) Internal resistance increase (pack; cell/ module recommended)		Internal Resistance
Expected lifetime in calendar years Commercial warranty period Expected lifetime: Number of charge-discharge cycles Cycle-life Reference test C-rate of relevant cycle-life test Capacity threshold for exhaustion	Number of full charging and discharging cycles Capacity throughput Energy throughput	Battery lifetime
Temperature range idle state (lower boundary) Temperature range idle state (upper boundary)	Temperature information Time spent charging during extreme temperatures Time spent in extreme temperatures	Temperature conditions
	Number of deep discharge events (recommended for EV, industrial) Number of overcharge events (recommended) Information on accidents	Negative events

1) BMS limitation: Data specified for all battery categories must be reported regardless of BMS use
2) Category listed as part of entire battery passport scope. No data attribute applies solely to this battery category

Please refer to the DIN DKE Spec 99100 text and the Excel document “Battery Passport Data Longlist” for more information.

QUESTION 5

What value does the digital battery passport unlock?

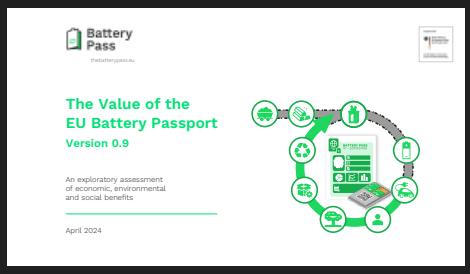
With the battery passport, transparency is created by making comprehensive data available to different actors along the battery life cycle. It is not only a regulatory compliance tool benefitting market surveillance authorities. By closing existing information asymmetries, the battery passport will unlock major value to industry and society alike.

Based on the respective data, informed decisions can be taken, processes be improved, and circular business models enabled – all together leading to an increase in economic value as well as a reduction in negative environmental and social impacts.

To learn more, read 'The Value of the EU Battery Passport', published in April 2023.

Full document

Executive Summary

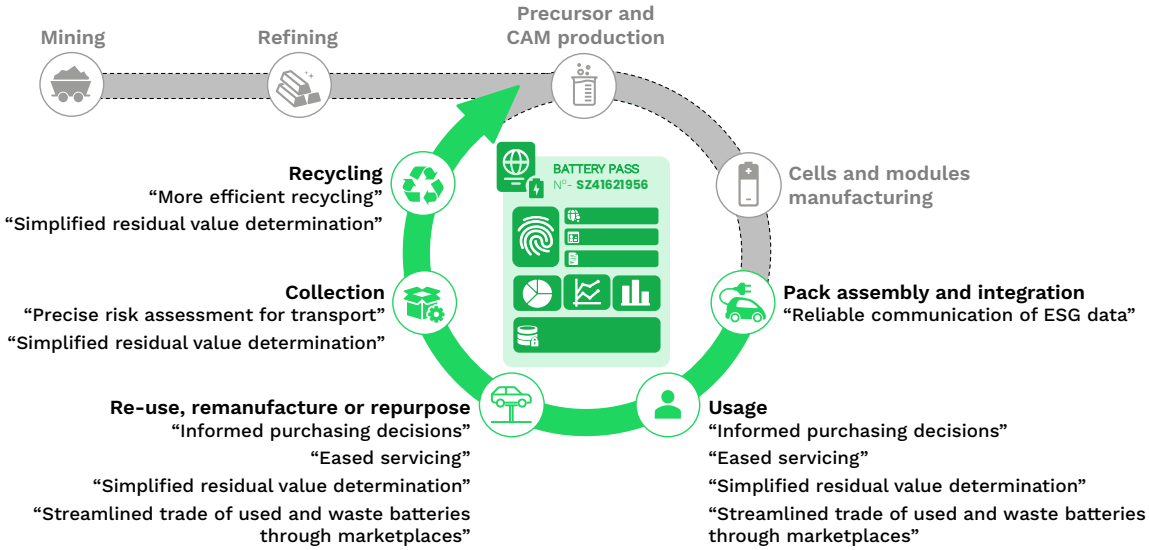


Battery Pass will be releasing a further publication on the expected value of the EU battery passport in late 2024. This will include further analysis on specific considerations for light means of transport (LMTs), an assessment of the required implementation efforts, and a synthesis of the benefits of the battery passport and outlook on Digital Product Passports (DPPs) in general.

Direct use cases of the battery passport mainly unlock value along the downstream value chain

Value of the passport:

- Potential additional value beyond regulatory compliance pending conditions beyond regulatory requirements (see "potential" use cases)
- Direct value add along several dimensions (environmental, social and economic)



QUESTION 6

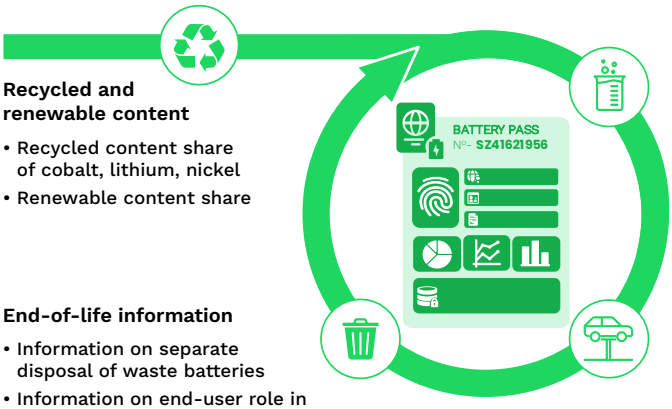
How are circularity aspects considered for the battery passport?

The information requirements of the battery passport are aimed at boosting repurposing efforts as well as the efficiency of collection, dismantling and recycling of batteries and the recovery of raw materials.

The battery passport requires four types of circularity information:

1. **Recycled and renewable content:** The battery passport must specify the recycled content share of cobalt, lithium, lead, and nickel, as well as the renewable content share. The Battery Pass consortium also recommends calculating and declaring pre- and post-consumer shares.
2. **Materials and composition:** To support second-life uses, the battery passport must include information on the general and detailed composition of the battery (with restricted data access), hazardous substances, as well as key symbols and their meaning.
3. **Removability/replaceability:** Information on how to dismantle batteries, details about spare parts and suppliers, and safety measures must be included to help manage used or waste batteries.
4. **End-of-life information:** The battery passport must provide information on the separate disposal of waste batteries, as well as details on take-back and collection points to improve collection rates.

Overview of battery passport circularity information



Recycled and renewable content

- Recycled content share of cobalt, lithium, nickel
- Renewable content share

Battery materials and composition

- General and detailed composition
- Hazardous substances and their impact
- Key symbols and their meaning

End-of-life information

- Information on separate disposal of waste batteries
- Information on end-user role in waste collection and prevention
- Information on take-back
- Information on collection points

Dismantling information

- Dismantling information (manual for the battery removal and manual for the disassembly)
- Information on spare parts and suppliers
- Part numbers of components
- Safety measures

QUESTION 7

What supply chain due diligence information is included in the battery passport?

For the battery passport, the EU Battery Regulation requires economic operators to publicly share the information in their due diligence reports. The Battery Pass consortium recommends aligning this report with the due diligence requirements of other regulations and considering whether key parts of the report should be presented as individual data points, rather than just a PDF link.

The regulation only mandates the due diligence report for the battery passport. However, the Battery Pass consortium further explored the content, potential harmonisation with other legislation and additional voluntary supply chain due diligence information for the battery passport.

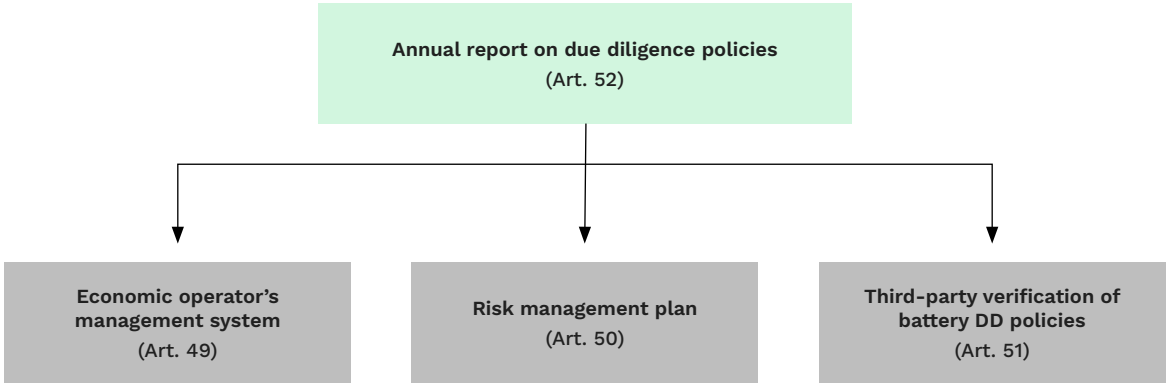
As a result, Battery Pass recommends including additional voluntary information in the report. This could involve third-party supply chain assurances, supply chain indices like those developed by the Global Battery Alliance, as well as information about the origins of the battery materials.

For further information, see also section 6.4 of the Battery Passport Content Guidance.

Information of the due diligence report is the only mandatory battery passport data point for responsible supply chains

The due diligence report

The due diligence report, made available via the battery passport, shall provide documentation on three main elements (based on the 5-step OECD framework):



QUESTION 8

Which performance and durability data attributes are in scope of the battery passport?

The battery passport requires information on around 40 different performance and durability data attributes. These include information on battery energy/capacity, power, resistance, and the number of charge and discharge cycles. It also requires reporting on temperature conditions and negative events the battery encounters during its use.

The battery passport separates data into static (pre-use) and dynamic (in-use) categories.

- Static data points provide information about the battery model and are mostly publicly available.
- Dynamic data points pertain to individual batteries and are accessible only to persons with a legitimate interest.

The EU Battery Regulation also distinguishes some of the requirements by the different battery categories such as electric vehicles, stationary battery storage systems and LMT batteries.

Please note that the list of data attributes below has been updated to reflect the information as included in the DIN DKE Spec 99100 (to be published in late 2024), and therefore differs from Figure 13 shown in the Battery Passport Content Guidance (p.61).

Around 40 performance and durability data attributes are required for the Battery Passport, while detailed descriptions are falling short in the Battery Regulation

Access groups:
- Public
- Interested persons

Battery categories:
- All batteries
- EV batteries (if BMS is used)
- LMT batteries (if BMS is used)
- Industrial batteries incl. stationary ESS > 2 kWh
- Stationary BEES > 2 kWh

Topic Performance data attributes		Subtopic
Static Data	**Dynamic Data**	
Rated capacity Capacity fade Certified usable battery energy (recommended) Minimal, nominal and maximum voltage, with temperature ranges when relevant	Remaining capacity Certified usable battery energy (recommended) State of certified energy (SOCE) State of charge (SoC)	Capacity, energy and voltage
Original power capability Power fade Maximum permitted battery power Ratio between nominal battery power and battery energy (recommended)	Where possible, remaining power capability	Power Capability
Initial round trip energy efficiency Where applicable, round trip energy efficiency fade Round trip energy efficiency at 50% of cycle life Initial self-discharge rate	Where possible, remaining round trip energy efficiency Current self-discharge rate (recommended) Evolution of self-discharge rate (recommended)	Energy round trip efficiency Self-discharge
Internal battery resistance (cell & pack) Internal resistance increase (pack; cell/ module recommended)		Internal Resistance

Topic Durability data attributes		Subtopic
Static Data	**Dynamic Data**	
Expected lifetime in calendar years Commercial warranty period Expected lifetime in number of charge-discharge cycles Cycle-life reference test C-rate of relevant cycle-life test Capacity threshold for exhaustion	Number of full charge-discharge cycles Capacity throughput Energy throughput	Battery lifetime
Temperature range idle state (lower boundary) Temperature range idle state (upper boundary)	Temperature information Time spent charging during extreme temperatures Time spent in extreme temperatures	Temperature conditions
	Number of deep discharge events (voluntary for EV, industrial) Number of overcharge events (recommended) Information on accidents	Negative events

QUESTION 9

How is the battery carbon footprint calculated and where can I find detailed guidance?

The carbon footprint of a battery is calculated by collecting data on activities such as energy use and materials and then multiplying these by their respective emissions factors. These figures are combined to create carbon footprints for each production process of the material or component.

The carbon footprint must be calculated for four stages of the battery's lifecycle:

1. Raw material acquisition and pre-processing,
2. Manufacturing,
3. Distribution,
4. End-of-life and recycling.

For the Manufacturing and Distribution stages, the draft Delegated Act establishing the methodology for the calculation and verification of the carbon footprint of EV batteries requires using company-specific activity data. For 'most relevant processes' in the other stages, secondary data may be used, but the Battery Pass consortium recommends using company-specific data.

While the EU Delegated Act must be complied with, the Global Battery Alliance GHG Rulebook and the Battery Pass Carbon Footprint Rules provide guidance on how to measure carbon footprints for each production step in the lifecycle stages.

EU Commission Draft Delegated Act

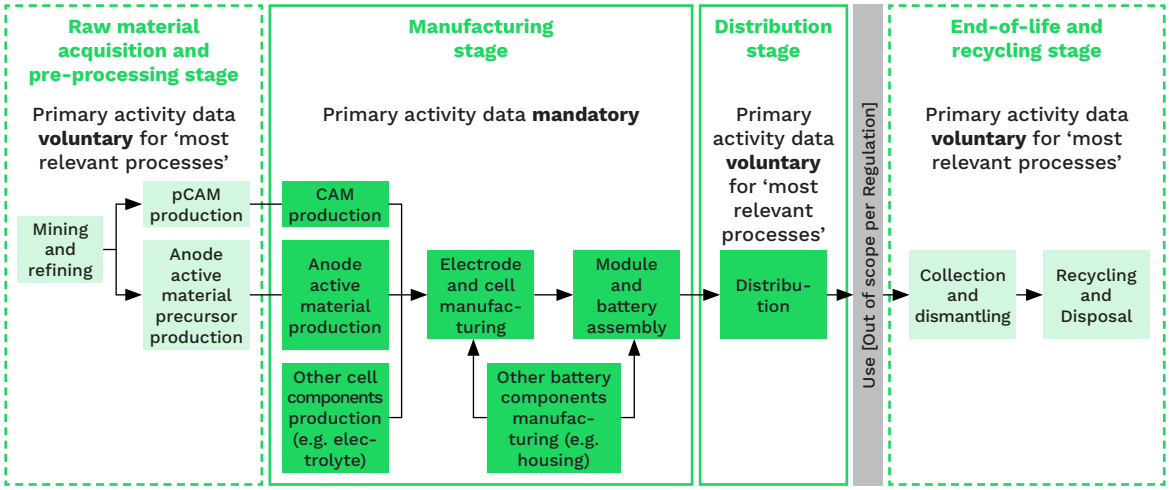
Global Battery Alliance GHG Rulebook

Battery Pass Carbon Footprint Rules (included in GBA Rulebook v2.0)

Company-specific activity data are required for the Manufacturing and Distribution stages in the battery carbon footprint declaration

Legend:

- Primary activity data **voluntary** for most relevant processes as per draft delegated act for EV batteries carbon footprint section 2.3 and 2.3.1 (EU COM 2024)
- Primary activity data **mandatory** as per draft delegated act for EV batteries carbon footprint section 2.3 and 2.3.1 (EU COM 2024)



Cradle-to-grave: The calculation shall comply with the "Commission Delegated Regulation supplementing Regulation (EU) 2023/1542 (...) **by establishing the methodology for the calculation and verification of the carbon footprint of electric vehicle batteries"**

Cradle-to-Grave: GBA GHG Rulebook v2.0 including Battery Pass Battery Pass CF Rules

'Company-specific dataset' means (...) a company-specific process, where all the activity data are company-specific, and which relates to a specific battery model produced in a specific production plant;
'Most relevant processes': pCAM, anode active material precursors, electrolyte slat and precursors, copper, aluminium, steel, battery recycling (section 2.3 and 2.3.2 of EU COM 2024).

EU COM (2024): Batteries for electric vehicles – carbon footprint methodology

QUESTION 10

How will remaining uncertainties regarding the battery passport be addressed?

The EU Battery Regulation will be supplemented with further methodological development – especially through around 50 Delegated and Implementing Acts. Some of these will be published by the European Commission (EC) by a certain date, others can be adopted under certain circumstances at the EC's discretion.

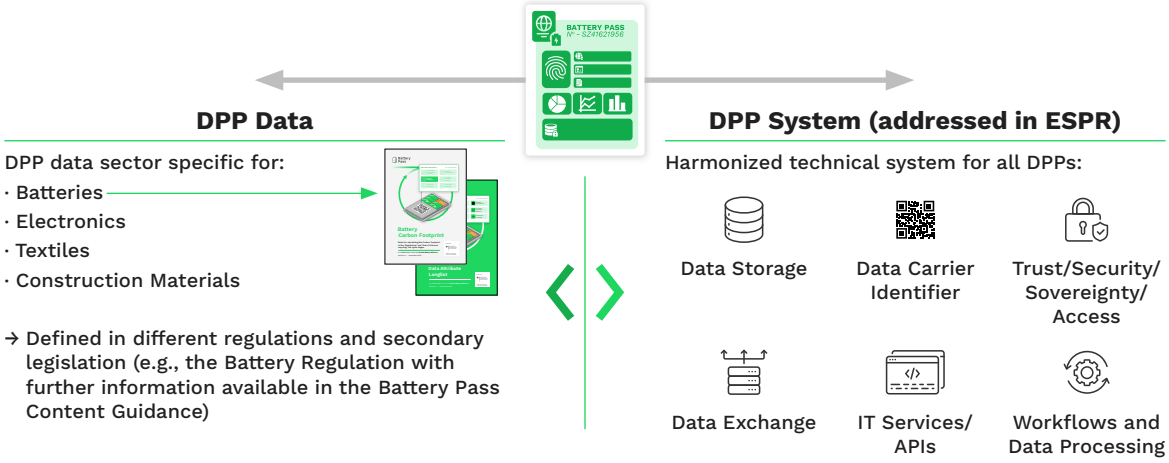
The Acts, known as the Secondary Legislation, will complete the Battery Regulation in detail; ensuring uniform conditions, calculations and verifications. Others will amend the Regulation based on market developments or technical and scientific progress. Topics covered concern, among others:

1. **Carbon footprint (CF):** Delegated Acts to establish the CF methodology, performance classes and threshold as well as Implementing Acts that specify the formats of these
2. **Circularity:** Delegated Acts to specify methodology for recycled content
3. **Performance and durability:** Delegated Acts to establish minimum values for electrochemical performance
4. **Battery passport access:** Implementing Acts to specify access rights
5. **Reporting to the Commission:** Implementing Act to harmonise format of data and information to be reported

Learn more about the Secondary Legislation following the EU Battery Regulation in this overview

In addition, the **Ecodesign for Sustainable Products Regulation (ESPR)** describes further details on technical aspects of DPP implementation (including the Battery Passport). Standardisation efforts for DPPs – being carried out by CEN-CENELEC in JTC24 – are ongoing in the context of the ESPR, which entered into force in July 2024. The details of these technical specifications on the 'operating system' of DPPs include e.g. data carriers and data exchange and are thus crucial for the implementation.

A digital product passport (DPP) consists of data and a system



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Further reading:
Battery Passport Content Guidance and supporting documents

Content Guidance

Data Attribute Longlist

Carbon Footprint Rules

EOL Allocation Analysis

CONSORTIUM LEAD SYSTEMIQ

CONSORTIUM PARTNERS

acatech, audi, BASF We create chemistry, BMW GROUP, Circulor, FIWARE FOUNDATION, Fraunhofer IPK, TWAICE Battery Analytics Software, umicore, VDE RENEWABLES

*under subcontract

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