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# Battery Passport Content Guidance - Executive Summary -

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

Version 1.1 / December 2023

Superseded by DIN-DKE-SPEC 99100

### **Remark**

The Data Attribute Longlist has been updated in January 2025 to align with DIN DKE SPEC 99100. Consequently, the data attributes described in subsequent sections may now be outdated due to changes including labels, revised order, adding or synthesis of data attributes. For details, please refer to DIN DKE SPEC 99100 or the updated data attribute list (v1.2)

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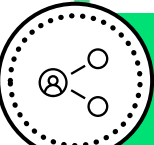


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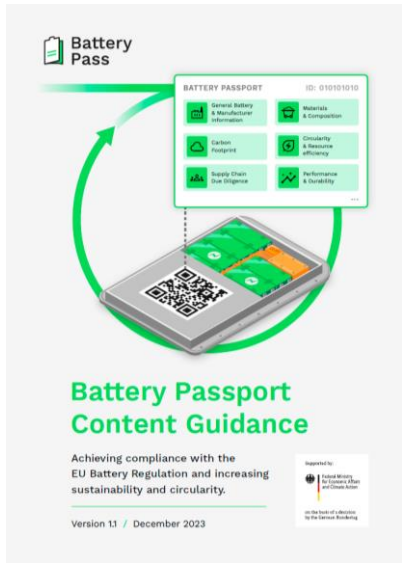
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# This Executive Summary document summarises the key insights and recommendations of the Battery Passport Content Guidance report

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Available on the Battery Pass website ([link](#))



# The Battery Pass Consortium

# The “Battery Pass” is a consortium of 11 partners from industry, science, technology and beyond, co-funded by BMWK aiming to provide guidance on the EU battery passport

## Key facts on the Battery Pass Consortium

- Evolved from the Circular Economy Initiative Germany (CEID)
- 11 consortium partners from industry, science, technology and beyond
- Co-funded by the German Federal Ministry for Economic Affairs and Climate Action (BMWK) with EUR 8.2 mn
- Aiming to advance the implementation of and provide guidance on the EU Battery Passport
- Five work packages including:
  - Project coordination and stakeholder engagement
  - Guidance on content requirements
  - Guidance on technical battery passport system
  - Development of a physical and software demonstrator
  - Value assessment of individual use cases and overall
- 3-year timeframe from April 2022 to April 2025

CONSORTIUM LEAD

SYSTEMIQ

CONSORTIUM PARTNERS

acatech



BASF  
We create chemistry

BMW  
GROUP

Circular

FIWARE  
FOUNDATION

Fraunhofer  
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TWAIICE

umicore






VDE RENEWABLES

\* under subcontract



Kick-off event of the Battery Pass Consortium in Berlin in April 2022

# The “Battery Pass” develops a perspective on battery passport content and technical requirements, builds a demonstrator, and assesses the value of the passport

Work packages		Sub-topics	
WP1	<b>Project Coordination and Stakeholder Engagement</b>		<ul style="list-style-type: none"> <li>a) Consortium coordination</li> <li>b) Content governance for quality and coherence</li> <li>c) EU alignment and global compatibility</li> <li>d) External communication for results dissemination</li> <li>e) Scaling up and making results permanent</li> </ul>
WP2	<b>Content Guidance</b>		<ul style="list-style-type: none"> <li>a) Carbon footprint</li> <li>b) Supply chain due diligence</li> <li>c) Circularity and resource efficiency</li> <li>d) Performance and durability</li> <li>e) Responsibility and liability</li> <li>f) Auditability</li> </ul>
WP3	<b>Technical System</b>		<ul style="list-style-type: none"> <li>a) Reference models for data collection along battery life cycle</li> <li>b) Contextualization regarding EU and global data spaces</li> <li>c) Process and access logics based on the reference models</li> </ul>
WP4	<b>Demonstrator</b>		<ul style="list-style-type: none"> <li>a) Data infrastructure</li> <li>b) Data storage &amp; process execution</li> <li>c) Integration with Catena-X/ EES/ Gaia-X</li> <li>d) Demonstration</li> </ul>
WP5	<b>Value assessment</b>		<ul style="list-style-type: none"> <li>a) Benefit modelling of individual use cases</li> <li>b) Benefit modelling of the battery passport overall</li> </ul>

*Focus  
of this  
document*

# The “Battery Pass” draws upon a network of associated and supporting partners and guidance of its Advisory Council

## The Battery Pass partner network

### Associated Partners



### Supporting Partners



### Advisory Council



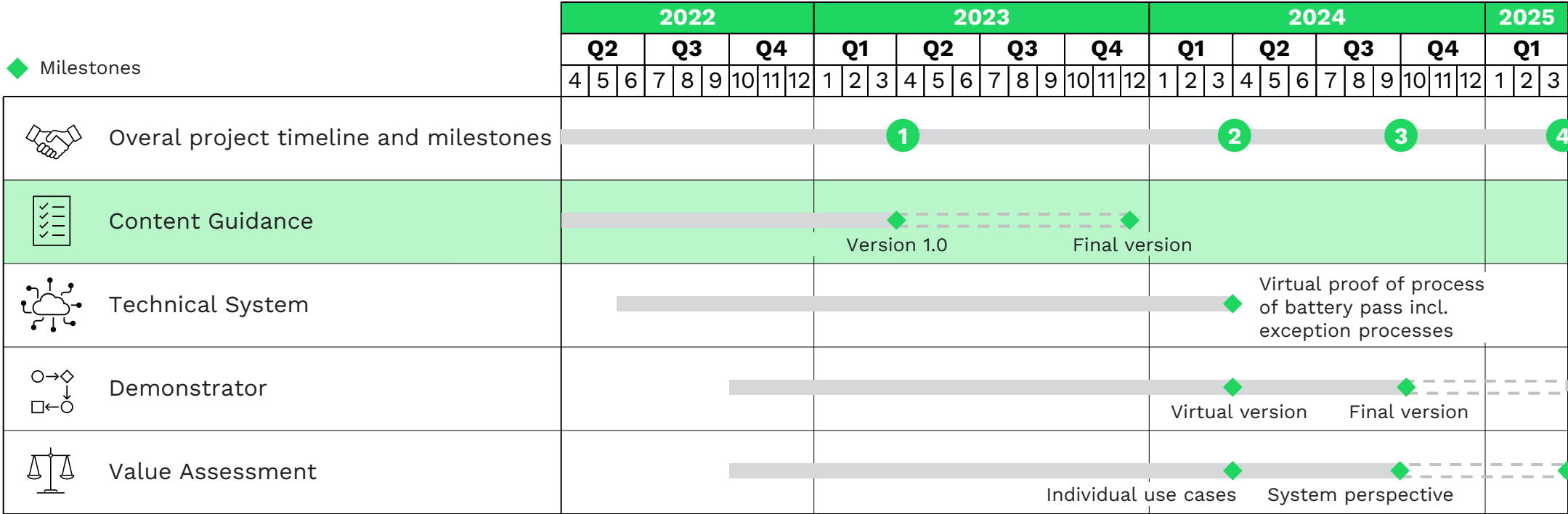
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# The “Battery Pass” project runs over 3 years with the Battery Passport Content Guidance representing the first project milestone




Value model discussed in community

- 1 Concept model for data and auditing
- 2 Technical system model
- 3 Demonstrator in use
- 4 Use case model and follow-up for implementation

# The “Battery Pass” published six documents in the context of the Content Guidance that help organisations understand passport related content requirements

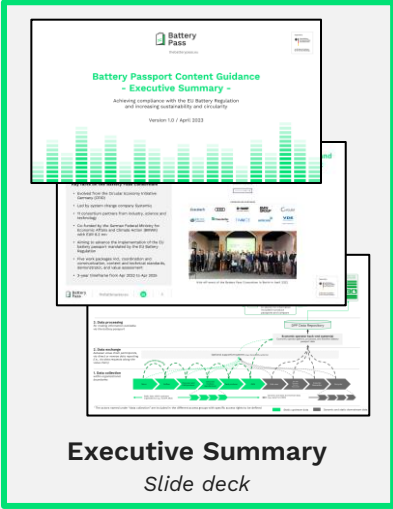
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**BATTERY PASSPORT CONTENT GUIDANCE**




**Battery Passport Content Guidance**  
Achieving compliance with the EU Battery Regulation and increasing sustainability and circularity.  
Version 1.1 / December 2023

**Comprehensive report**  
*PDF report (200 pages)*




**Battery Passport Content Guidance - Executive Summary**  
Achieving compliance with the EU Battery Regulation and increasing sustainability and circularity.  
Version 1.0 / April 2023

**Executive Summary**  
*Slide deck*



**Battery Passport Data Attribute Longlist**  
In collaboration with the Global Battery Alliance  
Version 1.0 / December 2023

**Data attribute longlist**  
*Excel file*




**Battery Passport Position Paper on content requirements of the EU Battery Passport**  
Recommendations to the European Commission by the Battery Pass Consortium  
Version 1.0 / July 2023

**Position Paper to EC**  
*PDF report*




All documents available on the Battery Pass website

**CARBON FOOTPRINT DOCUMENTS**



**Battery Carbon Footprint**  
Rules for calculating the Carbon Footprint of the 'Distributor' and 'End-of-life and recycling' life cycle stages  
In collaboration with the Global Battery Alliance  
Version 1.1 / December 2023


**Carbon Footprint Rules**  
*PDF report*



**Comparison of end-of-life allocation approaches**  
An analysis complementing the Battery Pass Rules for calculating the Carbon Footprint of the 'End-of-life and recycling' life cycle stage  
Version 1.0 / April 2023

**Carbon Footprint EOL Analysis**  
*PDF report*

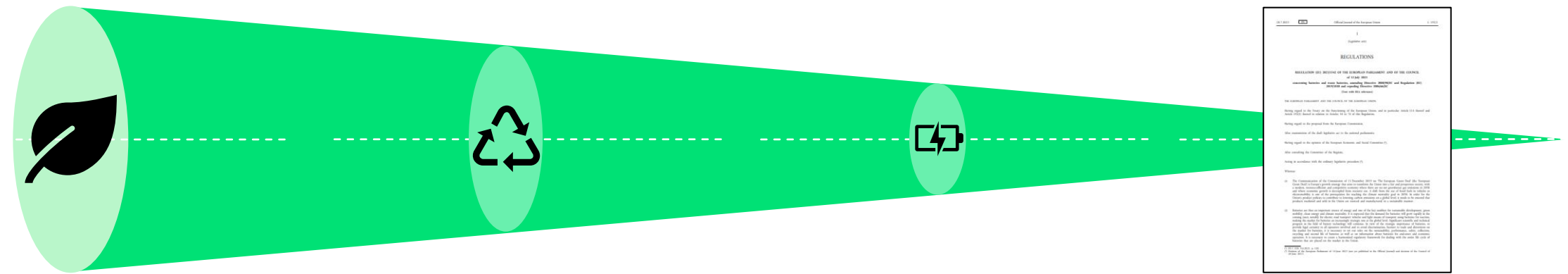
# The Content Guidance documents are directed at several stakeholder groups aiming to advance the implementation of the EU battery passport

Stakeholder groups	Objectives
 <b>Responsible economic operators</b>	<ul style="list-style-type: none"> <li>• One-stop-shop <b>aggregating and interpreting all content requirements</b> mandated by the EU Battery Regulation</li> <li>• Highlighting <b>harmonisation potential with further regulatory frameworks</b></li> <li>• Indicating additional value-adding aspects <b>enabling increased sustainability and circularity</b></li> </ul>
 <b>Battery value chain participants</b>	<ul style="list-style-type: none"> <li>• Educate and <b>guide on reporting duties of and access rights</b> to battery passport information</li> <li>• <b>Provide additional background information</b>, e.g., complementing definitions, links to other regulations etc.</li> </ul>
 <b>Other industry participants</b>	<ul style="list-style-type: none"> <li>• Serve as a <b>blueprint for other upcoming digital product passports</b></li> </ul>
 <b>Standardisation organisations</b>	<ul style="list-style-type: none"> <li>• Foundation for <b>translating regulatory requirements into standards</b> and unveil further standardization needs</li> </ul>
 <b>European Commission</b>	<ul style="list-style-type: none"> <li>• Highlight <b>ambiguities and inconsistencies</b> in the legal text and <b>requirements for further elaboration</b></li> <li>• Ensure a <b>balancing of sustainability objectives and industry feasibility</b></li> <li>• Contribute to the public consultation phase of the <b>upcoming delegated and implementing acts</b></li> </ul>
 <b>The Public</b>	<ul style="list-style-type: none"> <li>• Inform and educate the public through <b>information on the battery passport</b> and its <b>contribution to increased sustainability for batteries</b> and <b>knowledge for informed purchase decisions</b></li> </ul>
 <b>Battery Pass work packages</b>	<ul style="list-style-type: none"> <li>• Leverage as <b>foundation for the further specification of technical approaches</b> incl. a formal reference model for data collection, an initial framework to cover technical specifications and the development of a demonstrator</li> <li>• Direct <b>requirement and input for the identification and specification of use cases / value assessment</b></li> </ul>



# The Battery Regulation

# The Battery Regulation is part of the EU Green Deal and complements both the Circular Economy and Strategic Action Plans on Batteries



## European Green Deal

- Comprehensive package of policy initiatives launched in 2019 to:
- make EU climate-neutral by 2050
  - safeguard biodiversity
  - establish a circular economy
  - eliminate pollution
  - boost competitiveness
  - ensure a just transition

## Circular Economy Action Plan

- Adopted in 2020 as one key component of the Green Deal and pre-requisite to achieve EU’s 2050 climate neutrality goal
- Promotes the sustainable use of resources, especially in resource-intensive sectors
- Initiatives span along the entire lifecycle of products

## Strategic Action Plan on Batteries

- Introduced in 2018 as part of the Clean Mobility Package and updated with the EU Green Deal
- Aims at developing a sustainable and competitive battery value chain in Europe
- Objective to ensure a reliable and sustainable supply of batteries

## Battery Regulation

- Initially proposed in 2020 as part of the EU Green Deal and complementing the Strategic Action Plan for Batteries
- Entered into force in Aug 2023 replacing the EU Battery Directive
- Provides a legal framework aiming to promote sustainability, circularity, ensure safety and improve transparency



# The Battery Regulation aims to promote sustainability, encourage circularity, ensure safety, and improve transparency



**Promoting sustainability** in the production of batteries and reducing the environmental impact throughout their lifecycle



**Encouraging circularity** by making data available to enable second life usage and to improve recycling in terms of both quality and quantity


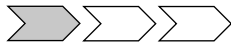

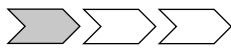

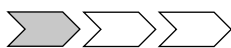



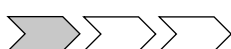

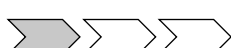







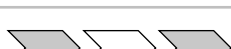

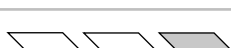




**Ensuring safety** through the protection of human health as well as the environment



**Improving transparency and consumer information** on the environmental and safety performance of batteries

# The Battery Regulation is a ground-breaking reform on the EU internal market as it covers the entire life cycle and mandates the first digital product passport

Regulation categories	Exemplary requirements	Lifecycle stages
 Restriction of substances	<b>Mercury, cadmium, lead</b> restrictions – delegated acts potentially extending this list	
 Recycled content	Min. levels of <b>recovered cobalt (16%), lead (85%), lithium (6%), and nickel (6%)</b> , increasing over time	
 Due diligence policies	<b>Implementation of a due diligence policy</b> , incl. traceability or chain of custody system	
 Green public procurement	<b>Criteria for sustainable procurement procedures</b> for batterie to be established	
 Labelling and marking	<b>List of general information</b> on battery labels determined; <b>QR Code</b> required	
 Safety parameters	Stationary energy storage systems requiring <b>technical documentation on safety</b>	
 Removability, replaceability	Portable batteries must be <b>easily removable and replaceable</b> by consumers	
 Performance, durability	<b>Minimum performance &amp; durability requirements</b> for batteries will be determined	
 SoH, expected lifetime	<b>Up-to-date data</b> in the BMS to determine SoH and expected lifetime	
 Carbon footprint	<b>Carbon footprint</b> reporting required for the first time and for each model per manufacturing plant	
 Waste battery management	<b>Collection targets</b> as well as <b>min. recycling efficiencies</b> and levels of <b>recovered Co, Cu, Pb, Li, Ni</b>	
 Improved data availability	An electronic record of a battery ( <b>battery passport</b> ) with key static and dynamic data	

Material sourcing & production      Use phase      End of life

# The Battery Regulation was generally welcomed by different stakeholders, yet the need to solve remaining challenges was addressed

Kamila Slupek  
Sustainability Director  
Eurometaux

“ We congratulate EU legislators for reaching today’s landmark agreement. The Battery Regulation’s new recycling and sustainability rules are **an important step to differentiating Europe’s batteries market on the global stage.** ”

Lauren Pagel  
Policy Director  
Earthworks

“ The European Union is **seizing the opportunity** presented by the transition to EVs and low-carbon transportation **to break away from irresponsible mining**, which has disproportionately impacted frontline and Indigenous communities in the Global South and marginalized communities. ”

Barbara Metz  
Executive Director  
Deutsche Umwelthilfe

“ With this **overdue agreement**, groundbreaking specifications for more sustainable batteries can finally come into force [...] ‘Unfortunately, **some problems remain unresolved.** If there is a pure switch from cars with combustion engines to electric cars, the environmental impact will increase significantly due to the rise in battery production. We need a fundamental shift away from private transport to buses, trains and bikes. In addition, the Commission must now exploit the circular economy potential for recycling batteries and their raw materials as quickly as possible through supplementary legal acts. ”

Rene Schroeder  
Executive-Director  
EUROBAT

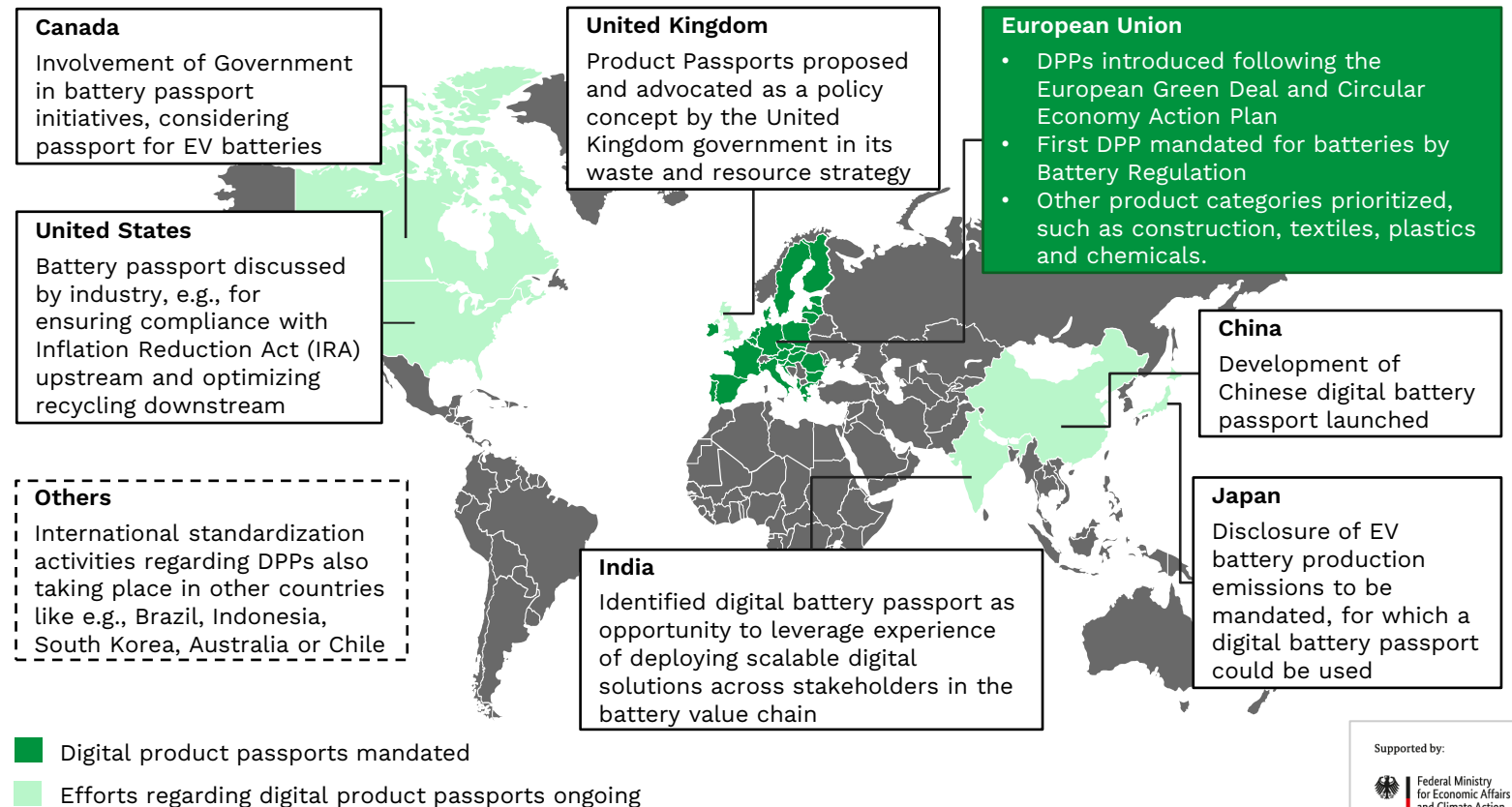
“ The Commission’s proposal has the **potential to be a real gamechanger** with its 360° policy approach. Sustainability and decarbonisation must go hand-in-hand with an ambitious industrial policy for batteries, as well as a comprehensive and technology-inclusive research and innovation framework. ”

# The battery passport will be the first digital product passport (DPP) implemented in the EU, which are seen as a key tool to advance the European Twin Transition

## DPPs to advance the EU Twin Transition

- The **European Twin Transition** is a policy framework that aims to simultaneously address two major challenges: the **green transition** to a sustainable and low-carbon economy and the **digital transformation** of society.
- **Digital product passports (DPPs)** are a concept that involves creating a digital record of a product's environmental and social impact throughout its lifecycle. They are seen as a **key tool** for advancing the European Twin Transition by promoting a more sustainable, circular and digital economy.
- The **Battery Passport** is the **first DPP introduced in Europe and globally** with further product categories to follow: textiles, construction, consumer electronics, plastics, chemicals and automotive sector.

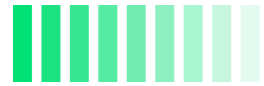
## Overview on other global DPP initiatives



# Initially proposed in 2020, the EU Battery Regulation entered into force in August 2023 with the battery passport becoming mandatory from February 2027 onwards

## Timeline of the EU Battery Regulation





# The Battery Passport Concept

# The purpose of the battery passport is to provide transparency and awareness, enable the shift to a circular economy, and create a level playing field

## Purpose of the battery passport



**Enable the shift from linear to circular economies**

- Provide the required “situational awareness” for batteries including, for example a “product-as-a-service” mode, instead of considering a product a consumable only
- Keep products within the system to save resources and minimize the amount of actual waste
- Leverage data for optimizing circularity processes



**Provide transparency to impact decisions**

- Enable informed decisions based on comprehensive data being provided digitally
- Bridge information gaps in the battery value chain to maximize lifetime value
- Leverage new insights from use and fate for design and production



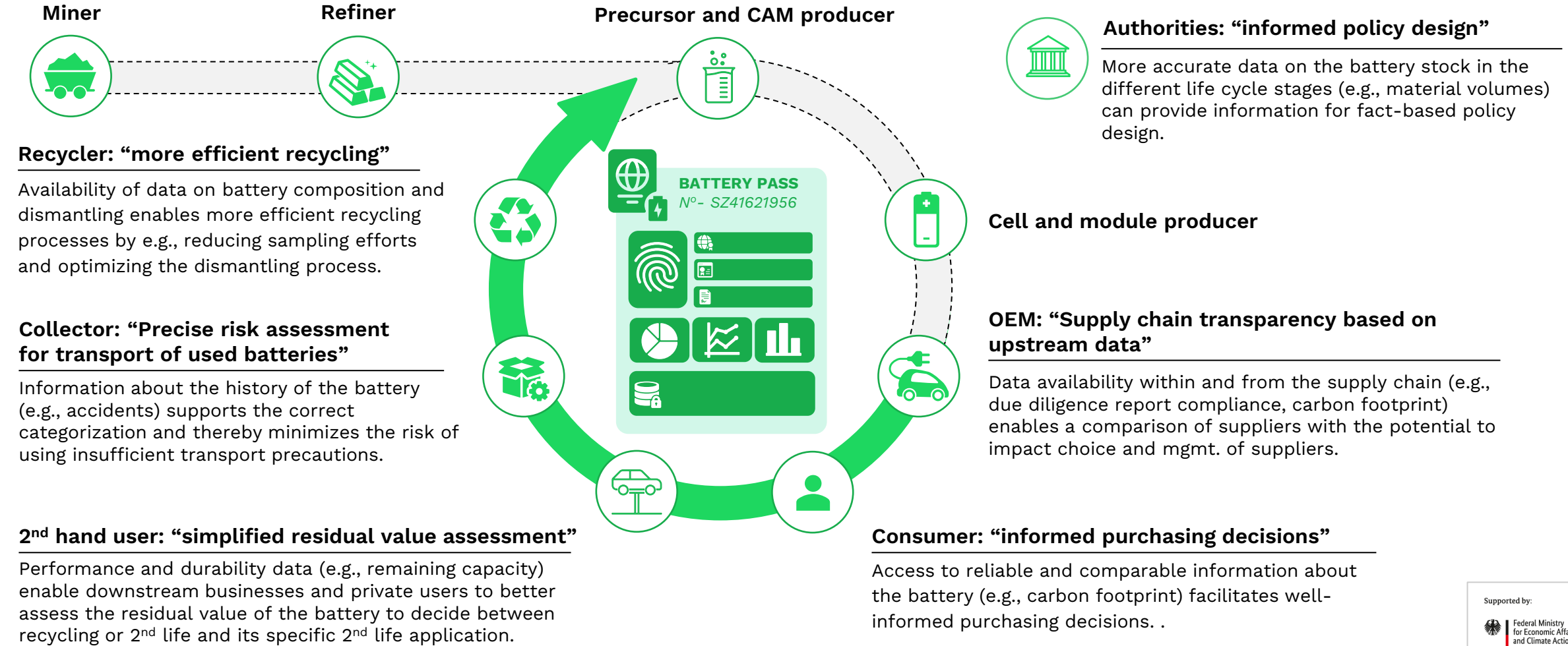
**Create a battery level playing field**

- Build the future battery value chain on multi-stakeholder responsibilities
- Move stakeholders to compete on sustainable innovation
- Develop business models that operate on value creation, value capture, and value conservation

# The battery passport will unlock major value along the entire value chain

**Value of the passport:**  Regulatory compliance and potential additional value pending conditions beyond regulatory requirements  
 Direct value add along several dimensions (environmental, social and economic)

Select examples

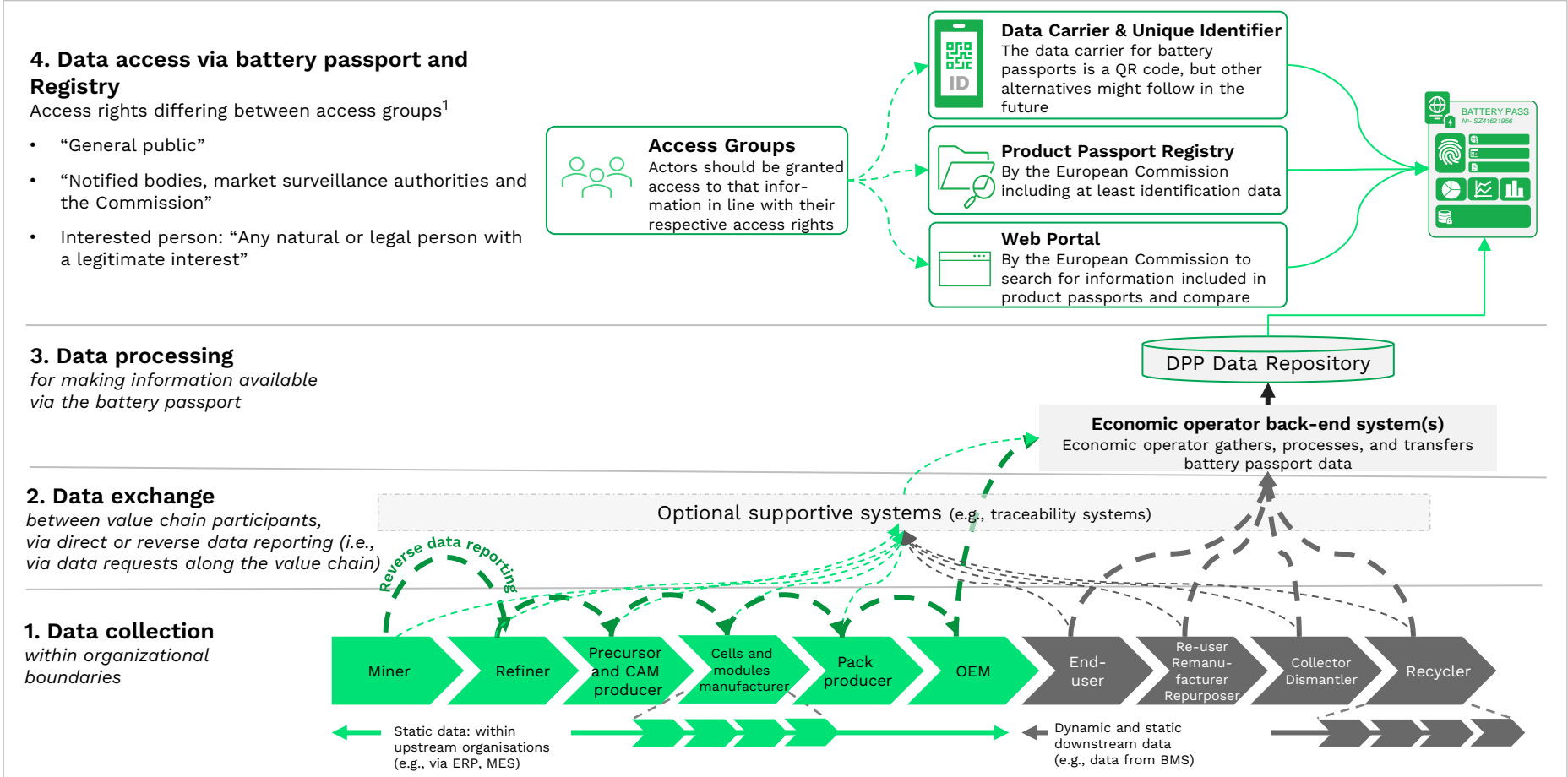


# The battery passport will be an electronic record of a battery containing a comprehensive set of information collected along the battery life cycle

## The digital battery passport

Article 77 of the EU Battery Regulation requires an electronic record for batteries (“battery passport”), which shall contain information relating to the battery model and information specific to the individual battery.

The European Commission defines a digital product passport (DPP) as “a structured collection of product related data with predefined scope and agreed data ownership and access rights conveyed through a unique identifier”<sup>2</sup>



Static upstream data      Dynamic and static downstream data

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on the basis of a decision by the German Bundestag

1) The actors named under “data collection” are included in the different access groups with specific access rights to be defined  
2) European Commission (2022b), p. 11

# Specifications of the battery passport such as timeline, scope, responsibility, and access groups are laid out in Article 77 of the EU Battery Regulation

## Specifications for the battery passport



### Timeline

The battery passport will be required from 18 February 2027



### Scope

- Batteries in light means of transport (LMT)
- Industrial batteries with a capacity greater than 2 kWh
- Electric vehicle (EV) batteries



### Responsibility

The responsibility lies with the economic operator (or an authorized representative) placing the battery on the market









### Access groups

- 1) The “general public”
- 2) “Notified bodies, market surveillance authorities and the Commission”
- 3) “Any natural or legal person with a legitimate interest in accessing and processing that information”

*Deep dives follow*

# EV, LMT, and industrial batteries > 2 kWh will be in scope for the battery passport

  Within scope of battery passport

Battery categories <sup>1</sup>	Battery definition and use cases	Battery weight
 <b>Electric vehicle (EV) battery</b>	<ul style="list-style-type: none"> <li>Provide electric power for the traction in hybrid or electric vehicles                             <ul style="list-style-type: none"> <li>of categories L (Regulation (EU) No 168/2013), if larger than 25 kg, or</li> <li>of categories M, N or O (Regulation (EU) 2018/858)</li> </ul> </li> </ul>	> 25 kg (category L)
 <b>Light means of transport (LMT) battery</b>	<ul style="list-style-type: none"> <li>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</li> </ul>	≤ 25 kg
 <b>Industrial battery<sup>2</sup></b>	<ul style="list-style-type: none"> <li>Designed specifically for industrial uses, or</li> <li>Intended for industrial uses after being subject to preparation for repurpose or repurposing, <b>or</b></li> <li>Any other battery that weighs more than 5 kg and is not an LMT, EV or SLI battery</li> <li>Industrial uses include (<i>Recital 15</i>)                             <ul style="list-style-type: none"> <li>industrial activities</li> <li>energy storage in private or domestic environments</li> <li>communication infrastructure</li> <li>generation and distribution of electric energy</li> <li>agricultural activities</li> <li>traction in other transport vehicles incl. rail, waterborne, aviation or off-road machinery</li> </ul> </li> </ul> <p><i>Sub-category: Stationary battery energy storage system</i></p> <ul style="list-style-type: none"> <li>Industrial battery with internal storage                             <ul style="list-style-type: none"> <li>specifically designed to store and deliver electric energy from and to the grid or store and deliver electric energy to end-users, regardless of where and by whom the battery is being used</li> </ul> </li> </ul>	> 5 kg (if no other category applies)
 <b>SLI (starter, lighting, or ignition) battery</b>	<ul style="list-style-type: none"> <li>Designed to supply electric power for starter, lighting, or ignition</li> <li>May also be used for auxiliary or backup purposes in vehicles, other means of transport or machinery</li> </ul>	-
 <b>Portable battery</b>	<ul style="list-style-type: none"> <li>Not designed specifically for industrial uses</li> <li>Neither an electric vehicle battery, nor a light means of transport battery, nor an SLI battery</li> </ul>	≤ 5 kg
 <b>Portable battery of general use</b>	<ul style="list-style-type: none"> <li>Rechargeable and non-rechargeable portable batteries specifically produced to be interoperable</li> <li>Common formats: 4,5 Volts (3R12), button cell, D, C, AA, AAA, AAAA, A23, 9 Volts (PP3)</li> <li>Providing traction to wheeled vehicles considered as toys (within Toy Safety Directive 2009/48/EC) (<i>Recital 15</i>)</li> </ul>	

# The manufacturer or importer placing the battery on the market or putting it into service is responsible for fulfilling the battery passport requirements

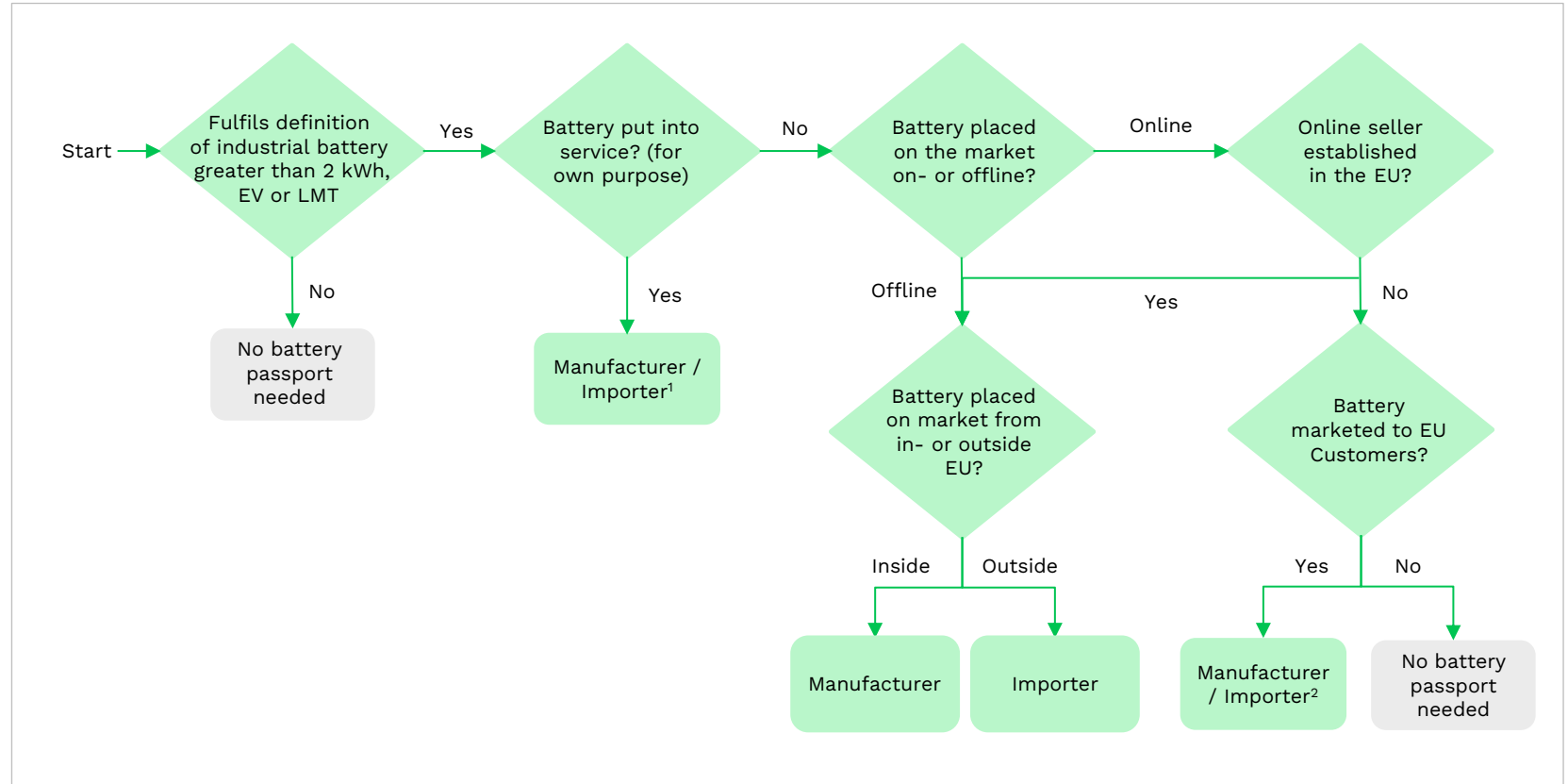
## Definition of the responsible economic operator

Responsibility lies with the economic operator **placing a battery on the market** or **putting it into service**.

This could either be the:

- **Manufacturer** (any natural or legal person who 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), or
- **Importer** (any natural or legal person established within the Union who places a battery on the market from a third country)

Decision tree determining the type of economic operator responsible

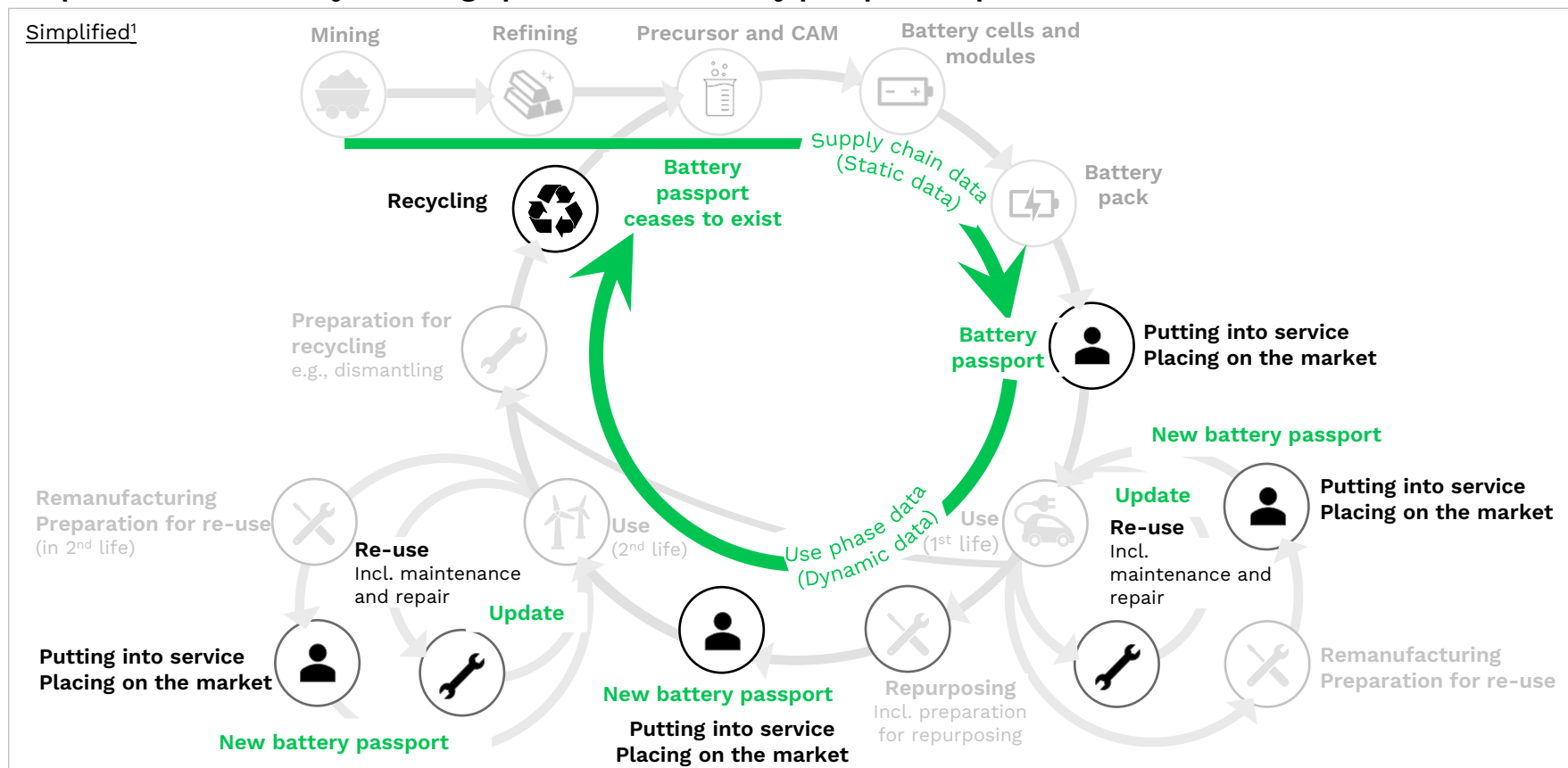


# Core responsibilities for the battery passport comprise making it accessible by attributing a unique identifier as well as updating and storing the information

## Battery passport responsibilities

- Attribute a unique identifier that is linked to the QR code that the battery is marked with to make the battery passport accessible
- Ensure that the information in the battery passport is accurate, complete, and up-to-date
- Store the data included in the battery passport
- (...) as well as many more general and technical requirements defined in Article 77 and 78

## Implications of battery handling operations on battery passport responsibilities



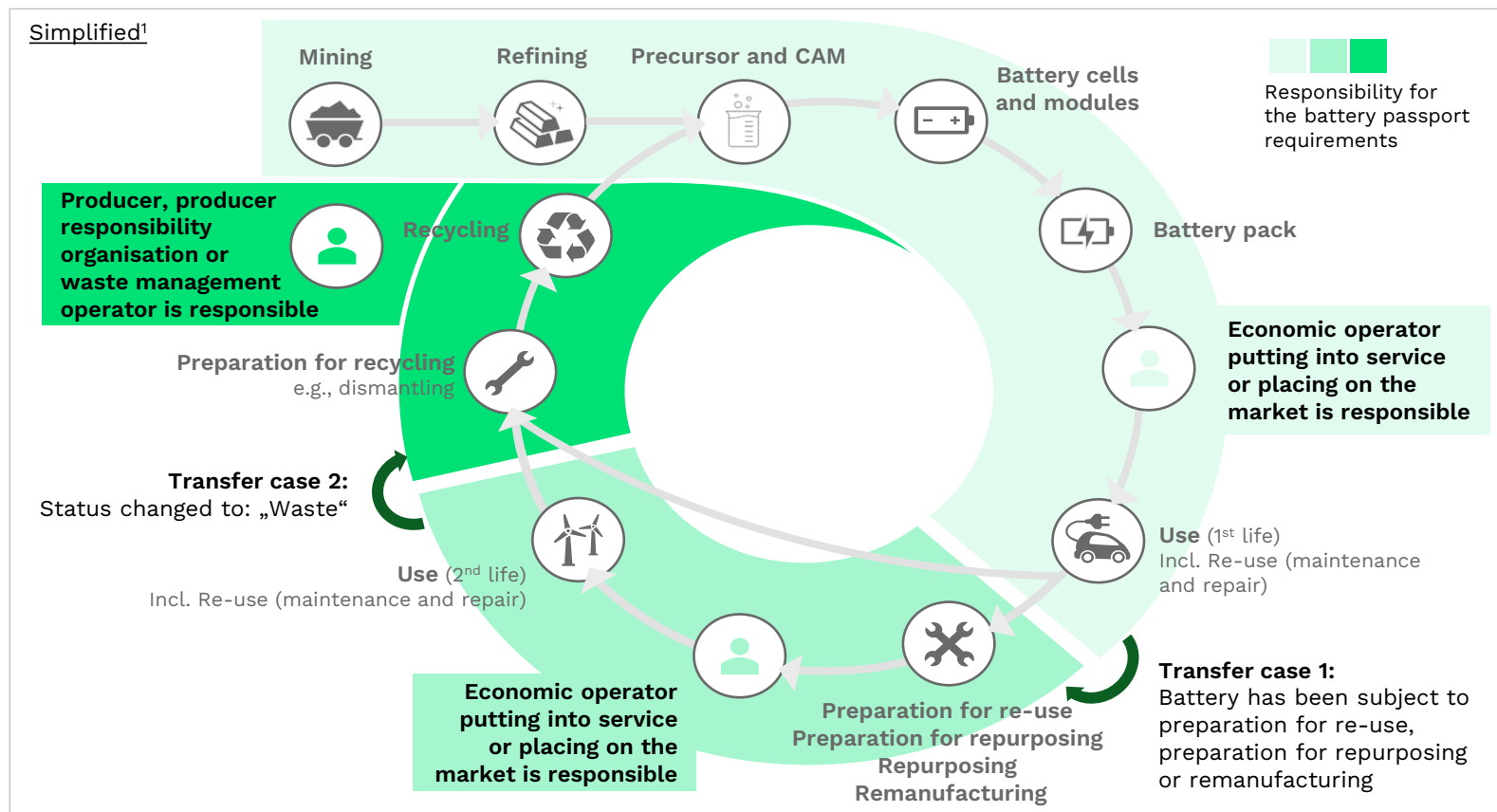
# In two specific cases, the responsibility for the battery passport needs to be transferred

## Transfer of responsibilities

In two cases, the regulation specifically requires the responsibility for the battery passport to be transferred from one economic operator to another:

- Transfer case 1:**  
 Battery has been subject to preparation for re-use, preparation for repurpose, repurposing or remanufacturing and must be placed on the market anew
- Transfer case 2:**  
 Status changed to “Waste”

## Responsibility periods and transfer cases for the battery passport



1) Treatment of manufacturing and processing waste as well as collection and transport can occur between all activities within the value chain; Preparation for re-use and remanufacturing can be carried out within the use phase



# The Content Requirements for the Battery Passport

# The mandatory scope of data attributes for the battery passport is defined by the Battery Regulation with further recommendations made by the Battery Pass

## Battery Pass approach

### Battery Regulation



The EU Battery Regulation defines **all mandatory data attributes** to be made accessible via the battery passport.

### Further regulations



**Further regulations** serve as a source to:

- complement definitions,
- generate additional background information, and
- harmonise reporting requirements.

Scope was limited to **EU and key Member States** regulations to align with other (upcoming) requirements in the region, e.g., the Proposal for Ecodesign for Sustainable Products Regulation (ESPR) and the German Supply Chain Act.

## Battery Pass objective and scope



Guidance on how to achieve **compliance with** the battery passport content requirements as mandated by **the EU Battery Regulation**.



### Recommendations how to:



...interpret the regulatory text



...harmonise with other regulations



...increase sustainability & circularity



More than 100 organizations from the broader Battery Pass network participated in a consultation webinar submitting more than 250 comments on the draft report during a feedback phase lasting around two months.

# In Annex XIII, the Battery Regulation introduces the comprehensive set of mandatory data attributes for the battery passport, which are detailed out in various articles and annexes

**EU Battery Regulation**

**Article 77**  
**Point 2:**  
 The battery passport shall contain information as set out in *Annex XIII*

**Annex XIII**  
 Information to be included in the battery passport

**Battery model information**

**Point 1: Publicly accessible**

- (a) Information of *Part A, Annex VI*
- (b) Material composition
- (c) Carbon footprint of *Articles 7(1) and (2)*
- (d) Information of the due diligence report of *Article 52(3)*
- (e) Recycled content as in documentation in *Article 8(1)*
- (f) Renewable content
- (g; h) Capacity; voltages
- (i) Power capability
- (j; k) Battery lifetime information
- (l) Temperate range
- (n) Round trip energy efficiency
- (o) Internal resistance
- (q) Labelling requirements of *Articles 13(3) and (4)*
- (r) EU declaration of conformity of *Article 18*
- (s) Waste batteries information of *Article 74(1a-f)*

**Point 2: Accessible to persons with a legitimate interest and the Commission**

- (a) Detailed composition
- (b) Part numbers and contact details of sources for spare parts
- (c) Dismantling information
- (d) Safety measures

**Point 3: Accessible to notified bodies, market surveillance authorities, and the Commission**

- (a) Results of tests report proving compliance

**Individual battery information**

**Point 4: Accessible to persons with a legitimate interest**

- (a) Performance and durability parameters of *Article 10(1)*
- (b) State of health information of *Article 14*
- (c) Status of the battery
- (d) Information and data as result of its use

**Annex VI, Part A: General labelling information**

(1) Manufacturer identification of <i>Article 38(7)</i>	(5; 6) Weight and capacity
(2) Battery category & identification of <i>Article 38(6)</i>	(7; 8; 10) Composition
(3; 4) Manufacturing place and date	(9) Extinguishing agent

**Article 7: Carbon footprint**

**Article 52: Disclosure of information on battery due diligence policies**

**Article 8: Recycled content**

**Article 13: Labelling marking of batteries**

**Article 18: EU declaration of conformity**

**Article 74: Waste batteries information**

(a; b) Role of end-users	(e) Meaning of labels and symbols
(c) Collection and take-back points	(f) Impact of substances
(d) Safety instructions	

**Article 10(1): Performance and durability**

- (1) Performance and durability parameters in *Annex IV, Part A*
- (1) Elements of *Annex IV, Part B* for technical documentation of *Annex VIII*

**Annex IV: Electrochemical performance and durability requirements**

*Part A:* Parameters related to the electrochemical performance and durability  
*Part B:* Explanation of the measurements

**Article 14: Performance and durability**

- (1) State of health and expected lifetime parameters of *Annex VII*

**Annex VII: State of health and expected lifetime parameters**

# The Battery Pass consortium has grouped the battery passport data attributes into seven content clusters – details on each are following on the next slides

**Data categories for the battery passport** (select data attributes shown below)

## Battery Pass

Battery ID: 0101010  
Battery passport ID: 1111010  
Responsible economic operator

### General information

- Manufacturing info (identity, place, date)
- Battery category
- Battery weight
- Battery status

### Labels and certifications<sup>1</sup>

- Symbols and labels
- Meaning of labels & symbols
- Declaration of conformity
- Compliance of test results

### Carbon footprint

- Carbon footprint (5 metrics)
- Weblink to CF study
- CF performance class

### Supply chain due diligence

- Due diligence report

### Materials and composition

- Hazardous substances
- Battery chemistry
- Critical raw materials
- Materials used in cathode, anode, electrolyte

### Circularity & resource efficiency

- Recycled content shares
- Manuals for removal, disassembly, dismantling
- Component part numbers & spare parts information
- Safety measures/instructions

### Performance & durability

- Capacity, energy, power, SoH
- Expected lifetime
- Negative events



# General battery information is of interest for end-users as well as authorities in the context of tracing back liability and verifying compliance



## General battery information to increase transparency and liability

- General battery information (e.g., identifying the battery (passport) or who manufactured the battery where and when) is often **difficult to obtain from the battery label**, especially for end-users.
- Furthermore, e.g., authorities struggle to accurately **trace back liability and verify compliance** since information is difficult to allocate and link to the respective battery and requirements differ between battery categories.

## Battery labelling in the regulatory context

- The **Battery Directive** introduced **registration requirements**, to be adopted into national law, including some general manufacturer and battery type information.
- As continuation of the Battery Directive, the **Battery Regulation** requires several **general information for the label of batteries** as well as clear, understandable, and readable **instructions**.
- Beyond batteries, the **Proposal for Ecodesign for Sustainable Products Regulation** introduces mandatory digital product passport requirements, including general product and manufacturing information.



## General battery information in the battery passport

- For the battery passport, the Battery Regulation requires economic operators to identify the **battery passport and the responsible economic operator, the battery, its manufacturing** (manufacturer, place, date), the battery **category, weight, and status**. Except for the status, these information shall be publicly accessible.
- The usage of **unique identifiers**, as introduced by the Battery Regulation and the ESPR, is important for the battery passport, e.g., to unambiguously determine **liabilities and responsibilities for data**.



# General battery and manufacturer information can be largely based on standardized reporting such as unique identifiers or manufacturing codes

## Battery passport reporting requirements

*Battery Regulation Article 77(3); Article 38(6, 7); Annex VI, part A, reference from Annex XIII, 1(a):*

- **Data attributes:** General information about batteries (as listed on the right side), also to be printed on the battery label
- **Access:** to the public

*Battery Regulation Annex XIII, 4(c):*

- **Data attribute:** Information on the status of the battery
- **Access:** to persons with a legitimate interest

## Battery Pass assessment and recommendation

Data requirements per Battery Regulation	Battery Pass reporting recommendation	Reasoning / value of the data
<b>Battery passport identification</b>	Unique battery passport identifier	<b>Unambiguous identification of an individual battery, its manufacturing, and its corresponding battery passport:</b> ensuring liability, responsibility, and clear attribution of data to the battery passport
<b>Battery identification</b>	Unique battery identifier	
<b>Responsible economic operator identifier</b>	Unique operator identifier	
<b>Manufacturer's identification</b>	Unique operator identifier	
<b>Manufacturing place</b> (manufacturing facility geographical location)	Unique facility identifier	
<b>Manufacturing date</b> (month and year)	Manufacturing codes	<b>Categories with differing reporting requirements:</b> determination of the battery passport content
<b>Battery category</b>	Category: 'stationary battery energy storage system', (other) 'industrial battery', 'LMT battery', or 'electric vehicle battery'.	
<b>Weight</b>	Weight in kg	<b>Basic battery characteristics:</b> key information and required to calculate other data
<b>Battery status</b> ( <i>'original', 'repurposed', 'reused', 'remanufactured' or 'waste'</i> )	Status: 'original', 'repurposed', 'reused', 'remanufactured' or 'waste')	



# The carbon footprint is a key policy measure to enable decarbonisation in the value chain through transparency



## Accurate product carbon footprints (PCF) are crucial for decarbonisation

- While batteries play a significant role in decarbonising the energy and transport sector, they come along with considerable **embedded carbon emissions**.
- **A uniform calculation methodology** is needed **to create transparency**, enabling informed decisions based on primary data that steer operational measures for life cycle decarbonisation.
- **Existing methodologies and standards leave room for interpretation** and do not provide sufficient guidance for company-specific PCF reporting.

## The carbon footprint in the regulatory context

- There are several **voluntary international standards and initiatives** for PCF reporting. In the EU, the carbon footprint is one environmental indicator within the **Product Environmental Footprint Recommendation** of the EU (PEF).
- The Battery Regulation makes the calculation and reporting of the **battery carbon footprint mandatory at placement on the market** in the EU. A **methodology for calculation and verification** of the carbon footprint will follow the Battery Regulation in form of a **Delegated Act**.



## The carbon footprint in the battery passport

- The Battery Regulation requires economic operators to declare the carbon footprint for each battery model per manufacturing plant.
- The results of the carbon footprint declaration must be publicly available via **the battery passport**, as an absolute value and differentiated per life cycle stage.



# The Battery Regulation defines specific carbon footprint reporting requirements, reflecting the implementation of the carbon footprint measures

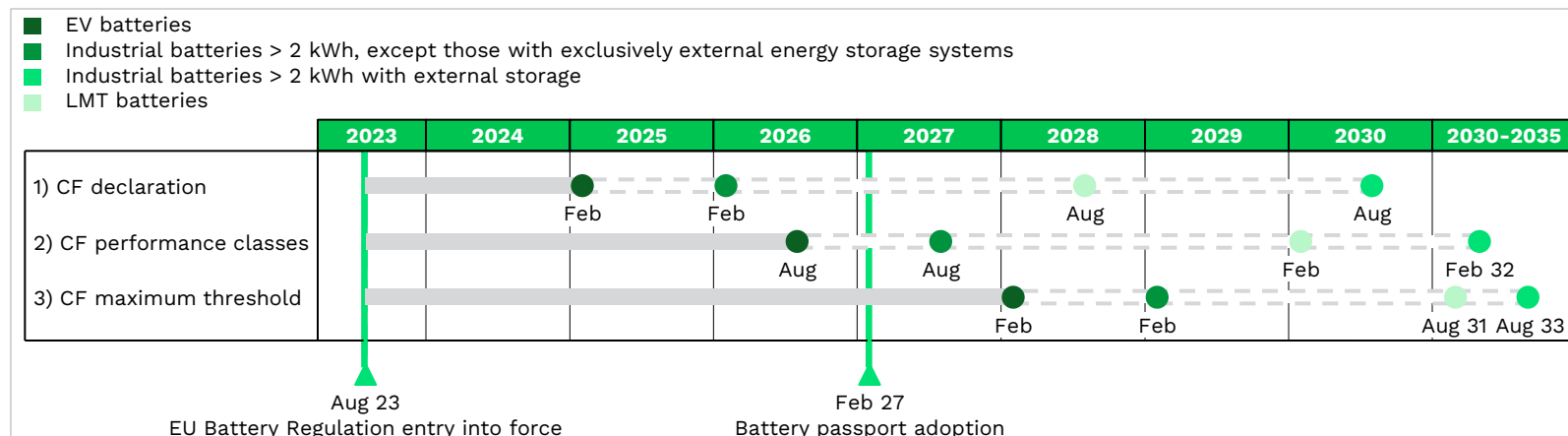
## Battery passport reporting requirements

*Battery Regulation Annex XIII, part 1(c), reference to Article 7(1;2)*

- **Data attributes:**
  - declared carbon footprint
  - share of battery carbon footprint per life cycle stage
  - carbon footprint performance class
  - web link to public carbon footprint study
  - administrative information about the manufacturer
  - information about the geographic location of the battery manufacturing facility
  - information about the battery model for which the declaration applies
- **Access:** to the public

## Carbon footprint timeline

- The CF requirements are implemented in 3 steps (deadline varies for different battery categories):
  - 1) Carbon footprint declaration
  - 2) Carbon footprint performance classes
  - 3) Carbon footprint maximum thresholds (not included in battery passport)
- For EV and industrial batteries w/o exclusively external storage, the CF declaration becomes mandatory before and for LMT batteries and industrial batteries with exclusively external storage after the battery passport adoption
- Only for EV batteries, the CF performance class needs to be reported before battery passport adoption

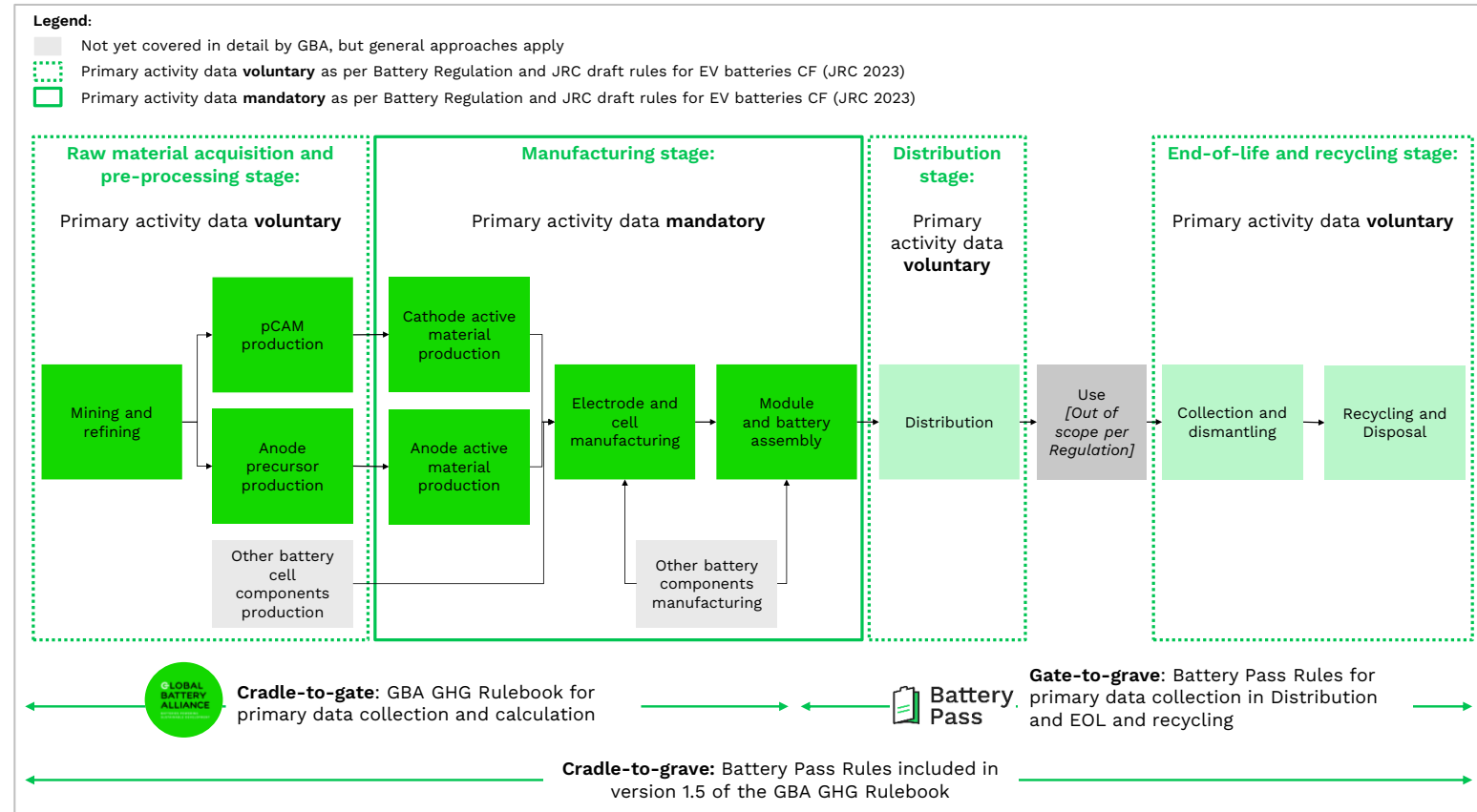




# The Battery Pass complemented the Global Battery Alliance's GHG Rulebook recommending to calculate carbon footprints using company-specific data

## Battery Pass carbon footprint assessment and recommendation

- **Current developments indicate that primary** (company- or supply chain-specific) data are **only required** for the “Main product production / **Manufacturing**” life cycle stage which sets the focus of company-specific carbon footprint data on this narrow scope while in other life cycle stages, secondary (i.e., average) data may be used.
- Provided that the final EU delegated act requirements are complied with, the Battery Pass **consortium recommends calculating** the battery carbon footprint based on the **GBA GHG Rulebook and Battery Pass Rules** to provide the data basis for measuring and optimising real-world CFs along the value chain – both documents build on existing standards in compliance with the regulatory requirements and cover the battery life cycle cradle-to-grave based on **guidance and prescriptions for the collection and usage of company-specific data end-to-end.**





# Battery due diligence helps to address social and environmental issues in complex battery supply chains



## Lack of transparency and regulations to create sustainable supply chains

- Today, battery materials and components are often fraught with **unethical working conditions** (e.g., forced or child labour) and **negative environmental effects** (e.g., water usage and pollution).
- Due to a **lack of supply chain transparency**, downstream suppliers might not appropriately identify and address such risks.
- At the same time, **regulatory requirements** preventing social and environmental issues are falling short.

## Due diligence in the regulatory context

- Several legislative initiatives have started to reflect social and environmental supply chain issues in **European** (e.g., EU Supply Chain Due Diligence Directive) and **national** (e.g., German Supply Chain Act) **regulations**.
- On a product level, **the EU Battery Regulation** introduces **battery due diligence obligations** to identify, prevent, and address risks linked to the sourcing, processing and trading of (secondary) raw materials. The requirements span the company's **management system and risk management plan**, e.g., including operating a chain of custody or traceability system.



## Due diligence in the battery passport

- For the **battery passport**, the Battery Regulation requires economic operators to make the information indicated in the report on the due diligence policies ("**due diligence report**") available to the **public**.
- Besides this due diligence report, **no additional supply chain due diligence information is mandatory** for the battery passport. Also, a harmonization with due diligence requirements of other regulations is not addressed in the Battery Regulation.



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

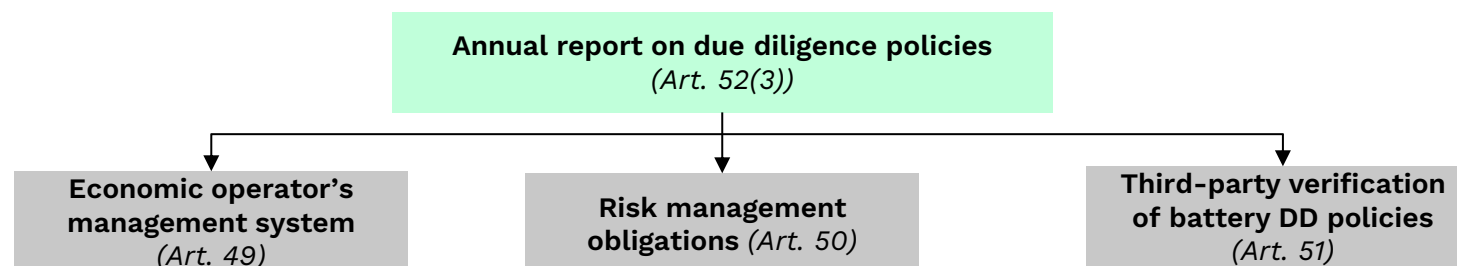
## Battery passport reporting requirements

*Battery Regulation Annex XIII, 1(d), reference to Article 52(3)*

- **Data attribute:** information indicated in the report on battery due diligence policy (“due diligence report”)
- **Access:** to the public
- **Action need:** economic operator placing the battery on the market to make the information of the annual due diligence report (valid when placing the battery on the market) available via a PDF (link to company website)

## 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):



## Battery Pass recommendations

1. **Harmonise the report with the due diligence requirements of other regulations** (e.g., expand beyond the materials stated in the Battery Regulation, explore synergies of required guidelines/ standards, cover all risk categories)
2. **Ensure additions of the Battery Regulation are covered** (report to also include elaboration on access to information, public participation in decision-making, and access to justice in environmental matters)
3. **Investigate making defined key information of the report** (currently displayed as part of the PDF) **available as individual data points.** Definition of machine readable in the context of the report needed.



# Beyond the due diligence report, the Battery Pass consortium recommends exploring voluntary battery passport additions

## Beyond requirements

- The due **diligence report is the only mandatory** battery passport supply chain due diligence information
- The Battery Pass consortium recommends exploring **additional voluntary supply chain due diligence information**. This way, transparency, attention and pressure for responsible supply chain practices can be increased.
- In this context, it is therefore recommended to investigate how to make **3<sup>rd</sup> party assurances, and in the future potentially also supply chain indices and provenance information** available via the battery passport

## Battery Pass recommendation: voluntary due diligence additions

The Battery Pass consortium explored potential meaningful additions to the battery passport. While a value for the addition exists, open questions remain to be discussed.

### 3<sup>rd</sup> party supply chain assurances (e.g., certifications)

- Can enable companies to engage with others on sustainable practices and enhance risk identification
- For the battery passport, they could allow for differentiation and making sustainability-related claims
- Assurances (and their key information) made available via the battery passport should be recognized under the Battery Regulation, be credible, and of high quality

### Supply chain indices (Global Battery Alliance)

- Subsequently to the risk-based due diligence approach of regulations, the focus should shift to accelerating positive impacts through supply chain practices of companies
- The GBA develops ESGE+ indices, allowing to score and benchmark sustainability performance
- A developed reporting framework could be made available via the battery passport

### Provenance (material source location)

- Transparency on provenance is increasing with attention to conflict-affected and high-risk-areas, allowing to better monitor practices, identify risks, and implement corrective measures
- In case of a regulatory obligation to unveil the provenance, it could be made available via the battery passport, ideally linked to additional information such as 3<sup>rd</sup> party assurances



# Battery material and composition information is key for logistics, dismantling, and recycling companies as well as consumers



## Material information for safe handling and informed decisions

- With the emergence of **various battery chemistries** (e.g., Li-ion, Lead-acid, solid-state batteries), it has become increasingly challenging for actors to effectively manage the variety of batteries.
- Several value chain participants such as **logistics, sorting, dismantling and recycling companies** find it increasingly difficult to e.g., assess safe transport requirements, define a battery's value, choose appropriate handling routes, and accurately calculate recycling efficiencies etc.
- In addition, also the **end-consumer** lacks transparency for informed purchasing decisions.

## Materials and composition in the regulatory context

- Today, the European **chemicals legislation** is one of the strictest globally and relevant for battery labelling, (hazardous) substance classification and authorization (e.g., CLP, REACH, SCIP).
- The previous **Battery Directive** required chemical and separate collection symbols on the label of batteries. **The new Battery Regulation** extends these labelling requirements.
- Beyond regulation, e.g., the automotive industry material data system **IMDS** and the **Global Automotive Declarable Substance List** process information on a substance level.



## Materials and composition in the battery passport

- For the battery passport, the Battery Regulation requires economic operators to specify the **general and detailed composition, hazardous substances and their impact, as well as key symbols and their meaning**.
- The information shall be accessible to the **public** - only **materials on cell level have restricted access**.
- The Battery Pass suggests aligning the battery passport reporting on materials and composition to **already established formats** (e.g., standardised identifiers such as CAS numbers).



# Information on battery chemistry and critical raw materials shall be made available to the public, the detailed composition also to persons with a legitimate interest and the Commission

## Battery passport reporting requirements

*Battery Regulation Annex VI, part A (7; 10)*

- **Data attributes:**
  - Battery chemistry
  - Critical raw materials present in the battery in a concentration of more than 0.1% weight by weight
- **Access:** to the public

*Battery Regulation Annex XIII, 2(a)*

- **Data attribute:** Materials used in the cathode, anode, and electrolyte
- **Access:** to persons with a legitimate interest and the Commission

## Battery Pass assessment and recommendation

Requirements per Battery Regulation	Battery Pass reporting recommendation	Reasoning / value of the data
<b>Battery chemistry</b>	<b>Specify chemistry as composition in general terms:</b> cathode and anode active material and electrolyte	<b>Indication for, e.g., logistic companies and consumers on key battery differences,</b> such as safety, lifespan, performance, recycling, and reuse
<b>Critical raw materials</b>	List all critical raw materials above 0.1% weight by weight	Awareness and monitoring of critical raw materials
<b>Detailed composition, incl. materials used in cathode, anode, and electrolyte</b>	<b>Materials above 0.1% weight by weight in anode, cathode, and electrolyte</b> <ul style="list-style-type: none"> <li>• Name materials (public standards)</li> <li>• Related identifiers (CAS numbers)</li> <li>• Mass fraction in percent</li> </ul>	<b>Enable second life operators such as sorters, dismantlers, and recyclers</b> to assess the value of a battery, decide on the handling route, ease recycling processes, and allow a fraud-free and accurate calculation of recycling efficiencies and recycled content



# Information on hazardous substances and their potential impact ensures safe and efficient second-life and end-of-life operations

## Battery passport reporting requirements

*Battery Regulation Annex VI, part A (8):*

- **Data attribute:** Hazardous substances [...] other than mercury, cadmium or lead
- **Access:** to the public

*Battery Regulation Annex VI, part B; Article 13(4):*

- **Data attribute:** Separate collection symbol
- **Access:** to the public

*Battery Regulation Article 13(5)<sup>1</sup>; Article 74(e; f):*

- **Data attributes:**
  - Symbol for cadmium if +0.002% cadmium
  - Symbol for lead if +0.004% lead
  - Impact of substances, in particular hazardous substances [...] on the environment and on human health, or safety of persons, including the impact due to inappropriate discarding of waste batteries, such as littering or discarding as unsorted municipal waste
  - Meaning of the labels and symbols marked on batteries [...] or printed on their packaging or in the document accompanying batteries
- **Access:** to the public

## Battery Pass assessment and recommendation

Requirements per Battery Regulation	Battery Pass reporting recommendation	Reasoning/value of the data
<b>Hazardous substances other than mercury, cadmium or lead</b>	<b>Hazardous substances, suggested above 0.1% weight by weight</b> <ul style="list-style-type: none"> <li>• Substance name (e.g., IUPAC or chemical name)</li> <li>• Hazard classes/categories</li> <li>• Related identifiers (CAS number)</li> <li>• Location of the substance</li> <li>• Concentration range in %</li> </ul>	<b>Fulfill health and safety obligations</b> <ul style="list-style-type: none"> <li>• Ensure safe and improved 2<sup>nd</sup> life and end-of-life operations such as recycling and dismantling.</li> <li>• Provide key safety information also to end-users</li> </ul>
<b>Impact of substances on environment, human health, safety, persons</b>	<b>Impact of substances</b> (aligned with CLP hazard classes) via common hazard statements	
<b>Symbol for cadmium (Cd) if +0.002%</b>	Symbol for cadmium (Cd) <sup>1</sup>	<b>Ensure batteries are sent to separate collection facilities</b> for recovery and recycling
<b>Symbol or lead (Pb) if +0.004%</b>	Symbol for lead (Pb) <sup>1</sup>	
<b>Symbol for separate collection</b>	Separate collection symbol	
<b>Meaning of labels and symbols</b>	Explanation of meaning of all battery's symbols and labels	Ensure comprehensibility

<sup>1</sup>) Annex XIII refers to Article 13 (3) and (4) in the final Battery Regulation. The Consortium, however, considers Article 13(4) and (5) as correct reference and content of the battery passport because the reference in Annex XIII has mistakenly remained unchanged while the enumeration in the Article has changed compared to the consensus draft of the regulation. A correction should occur via secondary legislation. For more details see p. 73 of the Content Guidance.



# Circularity strategies enable secure and sustainable access to critical battery raw materials in light of demand and supply discrepancies



## Circular economy strategies to meet increasing battery (material) demand

- Circular economy strategies enable **secure and sustainable access to critical battery raw materials** by reduction and optimization of material demand, expanding material lifetime/use, and high-quality recycling.
- Today, however, batteries are **rarely designed keeping repairability or replaceability in mind**.
- In 2020, only **47%** of all portable batteries and accumulators sold in the EU were **collected for recycling**.

## Battery circularity in the regulatory context

- Circular (battery) design, only scarcely addressed in the Battery Regulation, is taken up by the ESPR, introducing **circular design parameters**.
- To improve recycling, the Battery Regulation introduces **collection and recycling rates** for all batteries. For increased recovery of raw materials, **recycled content** shares, recycling efficiencies, and material recovery rates are defined.
- Via **end-of-life instructions**, the Battery Regulation aims at better informing the end-user on the separate disposal and collection of waste batteries.



## Circularity in the battery passport

For the battery passport, the Battery Regulation requires different circularity and resource efficiency information:

- 1) **Battery removability and replaceability:** Dismantling information, information on spare parts and suppliers, safety measures
- 2) **Recycled content** share for cobalt, lead, lithium, nickel
- 3) **Renewable content** share
- 4) **Waste management:** Information on separate disposal of waste batteries, on take-back and collection points



# Removability and replaceability: battery removal and disassembly information should be complemented by additional design information and be provided as manuals

## Battery passport reporting requirements

*Battery Regulation Annex XIII, 2(b-d):*

- **Data attributes:**
  - Dismantling information
  - Part numbers for components and sources for replacement spares
  - Safety measures
- **Access:** to persons with a legitimate interest and the Commission

*Battery Regulation Annex VI, part A (9):*

- **Data attribute:** Usable extinguishing agent
- **Access:** to the public

## Battery Pass assessment and recommendation

- The Battery Pass consortium suggests **providing the dismantling information** required by the EU Battery Regulation **as part of two manuals:**
  - Manual for the removal of the battery from the appliance<sup>1)</sup>
  - Manual for disassembly of the battery pack
- Besides the dismantling information required by the Battery Regulation, the Battery Pass consortium advises to integrate the below information in the ‘Manual for disassembly of the battery pack’
  - type of construction of battery pack, modules, and cells
  - format and dimensions of battery cells, modules and pack
  - orientation of the battery cells
  - replaceability of modules and cells
  - characteristics of joints, screws, and fasteners
  - fillings, if used
  - casing
- It is suggested **to provide the two manuals, the part numbers and suppliers for components and the safety measures (instructions) as URL linking to pdf**
- Furthermore, it is recommended that the **information on the usable extinguishing agent** refers to **classes of extinguishers** (A, B, C, D, K)

<sup>1)</sup> EV batteries will also be affected by the End of Life Vehicle (ELV) Regulation. The EU Commission’s proposal (July 2023) for the new ELV Regulation provides for the introduction of a Circular Vehicle passport, which also contains information on the removal and replacement of parts and of the battery integrated in the vehicle.



# Recycled content: calculating the shares for cobalt, lithium, nickel, and lead is required, distinguishing between pre- and post-consumer waste recommended

## Battery passport reporting requirements

Battery Regulation Annex XIII, 1(e; f), Article 8, Recital 33

### • Data attributes:

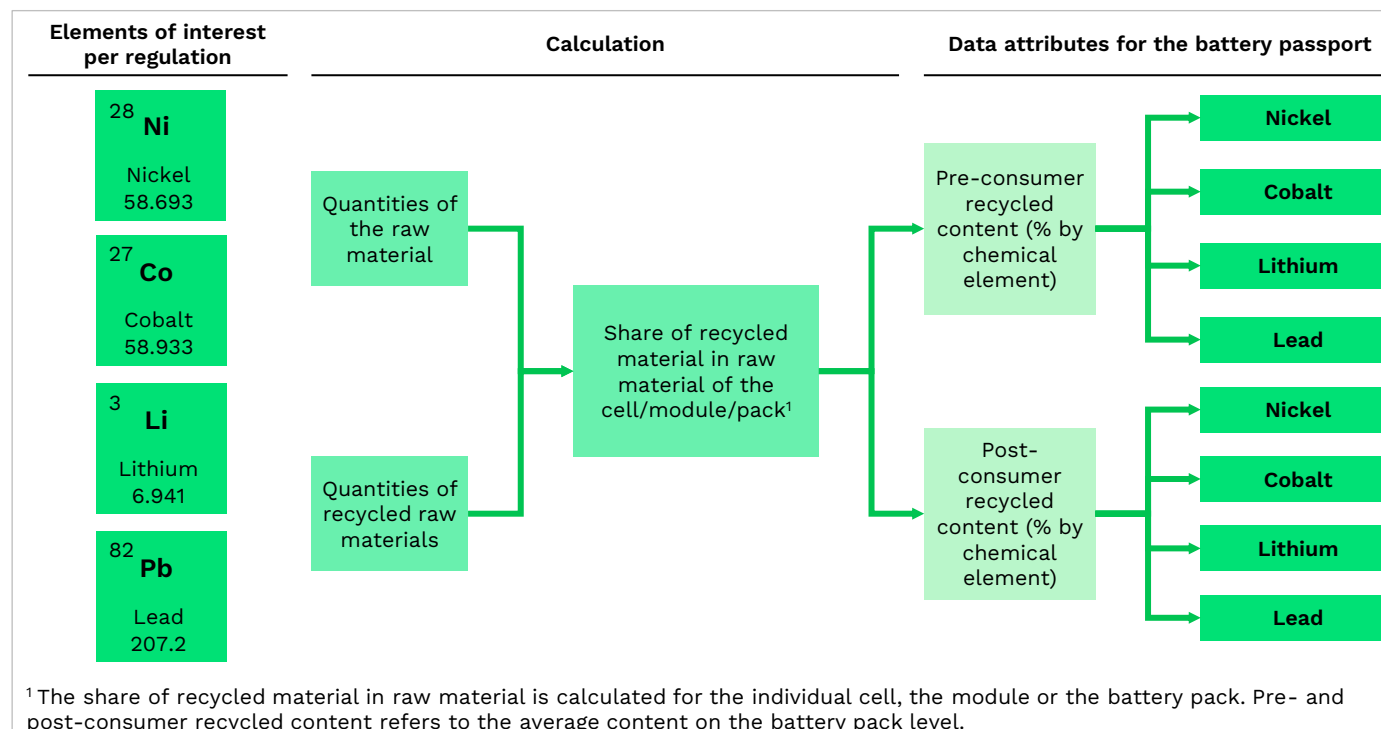
- Recycled content for each battery model per year and per manufacturing plant: share of cobalt, lithium, and nickel recovered from battery manufacturing waste or post-consumer waste present in active materials, and the share of lead recovered from waste present in the battery

- Renewable content share

### • Access: to the public

## Battery Pass assessment and recommendation

The Battery pass consortium suggests to calculate and declare the **recycled content** shares from **pre-consumer waste** and **post-consumer waste** of cobalt, lithium, nickel and lead, **separately**. This results in 8 data attributes to be reported for the passport.





# Informing end-users on the appropriate and available waste management of used batteries is key to enable recycling

## Battery passport reporting requirements

*Battery Regulation Article 74 (1a-c):*

- **Data attributes:**
  - Information on the role of end-users in contributing to waste prevention
  - Information on the role of end-users in contributing to the separate collection of waste batteries
  - Information on the separate collection, take-back and collection points, preparation for re-use, preparation for repurposing and treatment available for waste batteries
- **Access:** to the public

## Battery Pass assessment and recommendation

- The respective information mentioned in *Article 74 (1a-c)* should be provided in the battery passport as **URL linking to pdf**.
- Waste batteries shall be discarded in **designated separate collection points** (*Article 74 (1c)*).
- Producers/producer responsibility organizations shall install **take-back and collection points** as well as provide end-users with **corresponding information**.
- **Good practices and recommendations** concerning the use of batteries aiming at extending their use-phase should be developed and be provided to end-users.

### Excursus: Value of recycling traceability information for a circular economy

The Battery Regulation emphasizes the need for high collection and recycling of waste batteries, though end-of-life information is currently not required in the battery passport. Tracing recycling information connected to the original battery ID could be valuable in terms of sustainability and reduce the need for primary materials. However, this goal requires careful consideration of how material flows can be traced, especially when a battery has been dismantled into components. This touches on the scope and system boundaries of the battery passport as defined in the Battery Regulation.



# Performance and durability information of batteries facilitates a comparison of batteries at purchase and the determination of the value for a second life



## Battery performance and durability information is only scarcely shared so far

- Today, **little information on the performance and durability of batteries is shared** between the actors of the value chain. Equally, very **few standards** for the evaluation of performance and durability batteries exist.
- Therefore, at purchase, the **comparability of batteries is limited**. At the same time, the **determination of the residual value** of a battery and its usability in a second-life is hampered.

### Performance & durability in the regulatory context

- Per Battery Regulation, several data attributes must be reported in **a document accompanying the battery and the Battery Management System (BMS)**, if in place.
- Batteries will have to **follow minimum requirements on performance and durability**, as to be specified by Delegated Acts of the Battery Regulation.
- In addition, EV batteries will be covered in the upcoming **Euro 7 legislation**.



### Performance & durability in the battery passport

Battery passport requirements originate from Articles 77 and Annex XIII referring to Articles 10 and 14 as well as Annexes IV, and VII.

- 1) Relevant parameters listed in **Annex XIII(1) and (4)**
- 2) The values referred to in **Article 10(1) for LMT batteries, rechargeable industrial batteries with a capacity greater than 2 kWh, and EV batteries** when the battery is placed on the market and when it is subject to changes in its status
- 3) Information pursuant to **Article 14 for stationary battery energy storage systems, LMT batteries and EV batteries that use a BMS**



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

## Battery passport reporting requirements

*Battery Regulation Annex XIII referring to Articles 10 and 14 and their corresponding Annexes IV and VII*

- **Data attributes:**
  - ~40 separate data attributes  
Several mandatory data attributes are specific to battery categories (i.e. not mandatory for entire battery passport scope)
  - Distinction into static (pre-use) and dynamic (in-use) data;
  - Performance and durability includes most dynamic data attributes of the battery passport
- **Access:** varies between data attributes<sup>1</sup>

## Battery Pass assessment and recommendation

- The different data attributes were bundled into **content clusters**.
- These consist of **several static and dynamic** data attributes (for an overview see details on next slide).
- Most data attributes **lack a detailed description**, complicating their understanding.
- In addition, **only few standards for evaluation conditions exist**, that are needed to enable the comparison among different batteries.
- The **implementability of data attributes** for different battery categories and designs (High-T, redox-flow) is a major issue for further considerations.

## Performance & durability content clusters

### Performance

- Capacity, Energy, SoC, Voltage
- Power capability
- Round trip efficiency, self discharge
- Internal resistance

### Durability

- Expected lifetime
- Temperature conditions
- Negative events



# In addition to the mandatory scope per Battery Regulation, the Battery Pass consortium suggests few additional performance & durability data attributes

## Battery Pass assessment and recommendation

- Data attributes are distinguished by:
  - Static or dynamic behaviour and update requirement
  - Battery categories (see legend)
  - Access groups (see legend)
  - Most static data attributes are specified for all battery categories and public, while several dynamic data attributes are specific for a battery category and available only to interested persons
- Next to the mandatory scope of data attributes per Regulation, the Battery Pass consortium suggests few additional voluntary data attributes

**Legend**

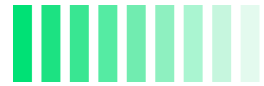
<b>Access groups</b>	<b>Update requirements<sup>1</sup></b>
<span style="background-color: #e0e0e0; border: 1px solid #ccc; display: inline-block; width: 15px; height: 10px;"></span> Public	<b>a)</b> From Art. 10; to be made available upon placement on market and status change (Re-use/repurposing...)
<span style="background-color: #90ee90; border: 1px solid #ccc; display: inline-block; width: 15px; height: 10px;"></span> Interested persons	<b>b)</b> Dynamic reporting depending on definition of 'up-to-date' in Art 77/Annex XIII or Art. 14

**Battery categories**

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

	Performance				
Static Data	<ul style="list-style-type: none"> <li> Rated capacity (in Ah)</li> <li> Certified usable battery energy (voluntary)</li> <li> Minimal, nominal and maximum voltage, with temperature ranges when relevant</li> </ul>	Dynamic Data	<ul style="list-style-type: none"> <li> Capacity fade<sup>a</sup></li> <li> Remaining capacity<sup>b</sup></li> <li> Remaining usable battery energy (voluntary)<sup>b</sup></li> <li> State of certified energy (SOCE)<sup>b</sup></li> <li> State of charge (SoC)<sup>b</sup></li> </ul>	<b>Capacity, Energy, SoH, voltage</b>	
	<ul style="list-style-type: none"> <li> Original power capability (in Watts)</li> <li> Maximum permitted battery power</li> <li> Ratio between nominal battery power and battery energy (voluntary)</li> </ul>		<ul style="list-style-type: none"> <li> Power fade<sup>a</sup></li> <li> Remaining power capability<sup>b</sup></li> </ul>	<b>Power Capability</b>	
	<ul style="list-style-type: none"> <li> Initial round trip energy efficiency</li> <li> (Initial) round trip efficiency at 50% of cycle life</li> </ul>		<ul style="list-style-type: none"> <li> Where applicable, energy round trip efficiency fade<sup>a</sup></li> <li> Current self-discharging rate<sup>b</sup></li> <li> Evolution of self-discharging rate<sup>b</sup></li> </ul>	<b>Energy round trip efficiency, Self-discharge</b>	
	<ul style="list-style-type: none"> <li> Initial self-discharging rate</li> <li> Internal battery resistance (cell &amp; pack)</li> </ul>		<ul style="list-style-type: none"> <li> Current internal resistance (pack, voluntary: cell/module)<sup>a</sup></li> <li> Internal resistance increase (pack; voluntary: cell/module)<sup>a</sup></li> </ul>	<b>Internal Resistance</b>	
	<b>Durability</b>				
	<ul style="list-style-type: none"> <li> Expected battery lifetime expressed in cycles, and reference test used, (except for non-cycle applications?), and in calendar years</li> <li> C-rate of relevant cycle-life test</li> <li> Period for which the commercial warranty for the calendar life applies</li> <li> Capacity threshold for exhaustion</li> <li> SOCE threshold for exhaustion (voluntary)</li> <li> Where appropriate, the date of putting into service</li> </ul>		<ul style="list-style-type: none"> <li> Current number of (full) charging and discharging cycles<sup>b</sup></li> <li> Capacity throughput<sup>b</sup></li> <li> Energy throughput<sup>b</sup></li> </ul>	<b>Expected Lifetime</b>	
	<ul style="list-style-type: none"> <li> Temperature range idle state (lower boundary)</li> <li> Temperature range idle state (upper boundary)</li> </ul>		<ul style="list-style-type: none"> <li> Time spent charging during extreme temperatures<sup>b</sup></li> <li> Time spent in extreme temperatures<sup>b</sup></li> </ul>	<b>Temperature conditions</b>	
			<ul style="list-style-type: none"> <li> Number of deep discharge events<sup>b</sup> (voluntary for EV, industrial)</li> <li> Number of overcharge events (voluntary)<sup>b</sup></li> <li> Accidents<sup>b</sup></li> </ul>	<b>Negative events</b>	

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



# Outlook

# Based on the elaborated content requirement perspectives, the “Battery Pass” will continue bringing in its expertise both ex- and internally

1.

## Integration in other Battery Pass results

Integration of content-related insights into a technical battery passport system guidance, a demonstrator and value assessment of the passport – all to be released in Q1 2024

2.

## Knowledge sharing with other organisations

Support and collaborate with other organisations and initiatives to build on Battery Pass results for complementing purposes (e.g., cross-sector requirements, standardisation efforts)

3.

## Involvement in secondary legislation process

Exploration and assessment of possibilities for Battery Pass to get involved in the secondary legislation process (Delegated and Implementing Acts) contributing expertise

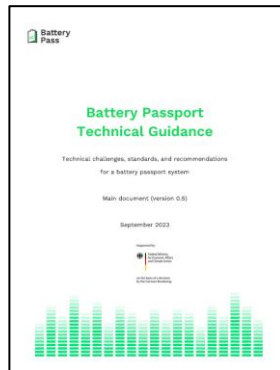
*Deep dives follow*

# 1 Results of the Content Guidance have been building the foundation for further Battery Pass publications which will soon be released



## Technical Guidance

- **Objective:** provide an overview on how the technical battery passport system could look like and which required technical standards it must support
- **Scope:** Technical Standard Stack incl. mapping of existing standards as well as key challenges and recommendations

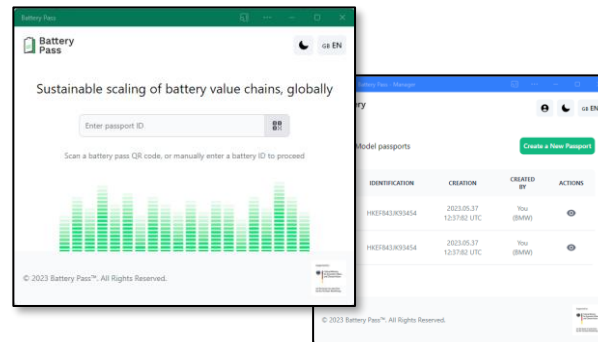


To be released Q1 2024



## Demonstrator

- **Objective:** provide a platform which integrates results on battery passport data and system and verifies technological feasibility of the passport
- **Scope:** software prototype (TRL 5) covering exemplary real-world data

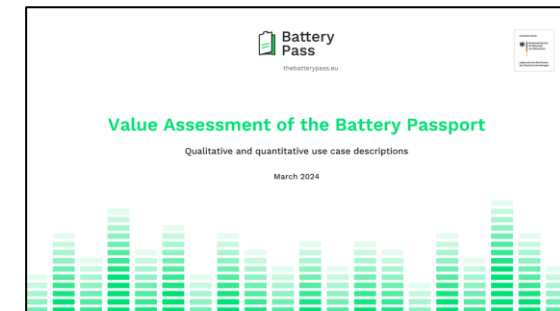


Draft demonstrator to be released Q1 2024



## Value Assessment

- **Objective:** Provide an analytical study to motivate stakeholders to use the battery passport proactively and leverage its full potential.
- **Scope:** benefit modelling of individual use cases as well as the battery passport overall (incl. a qualitative-conceptual evaluation and exemplary quantification)



First results to be released Q1 2024

## 2 “Battery Pass” will continue to support and collaborate with other major initiatives active in the digital product passport space



- European Commission “Digital-2021-Trust-01-DIGIPASS” winner
- Kicked off in October 2022 lasting 18 months (March 2024)
- Funding volume: EUR 2 mn
- Partners: 31 organisations
- Objective: build a common understanding of a cross-sectoral DPP
- Focus: Batteries, Textiles, Electronics



- Leading global voluntary passport initiative
- Objective: enabling transparency and accountability for risks and ESG impacts in EV battery value chains by creating a digital twin of the battery and aggregating data in a battery passport
- 3 early-stage proof of concepts were launched at WEF 2023
- Release of first set of ESG metrics (GHG Rulebook, Child Labour and Human Rights Indices) with additional metrics to follow



- Developing a comprehensive data ecosystem with standardized global data exchange for data-driven value chain in the automotive industry
- Based on GAIA-X data space technology to support data sovereignty with distributed data management and sophisticated identity and access management
- Focusing on several use cases including decarbonization and ESG reporting, circularity & battery passport and others



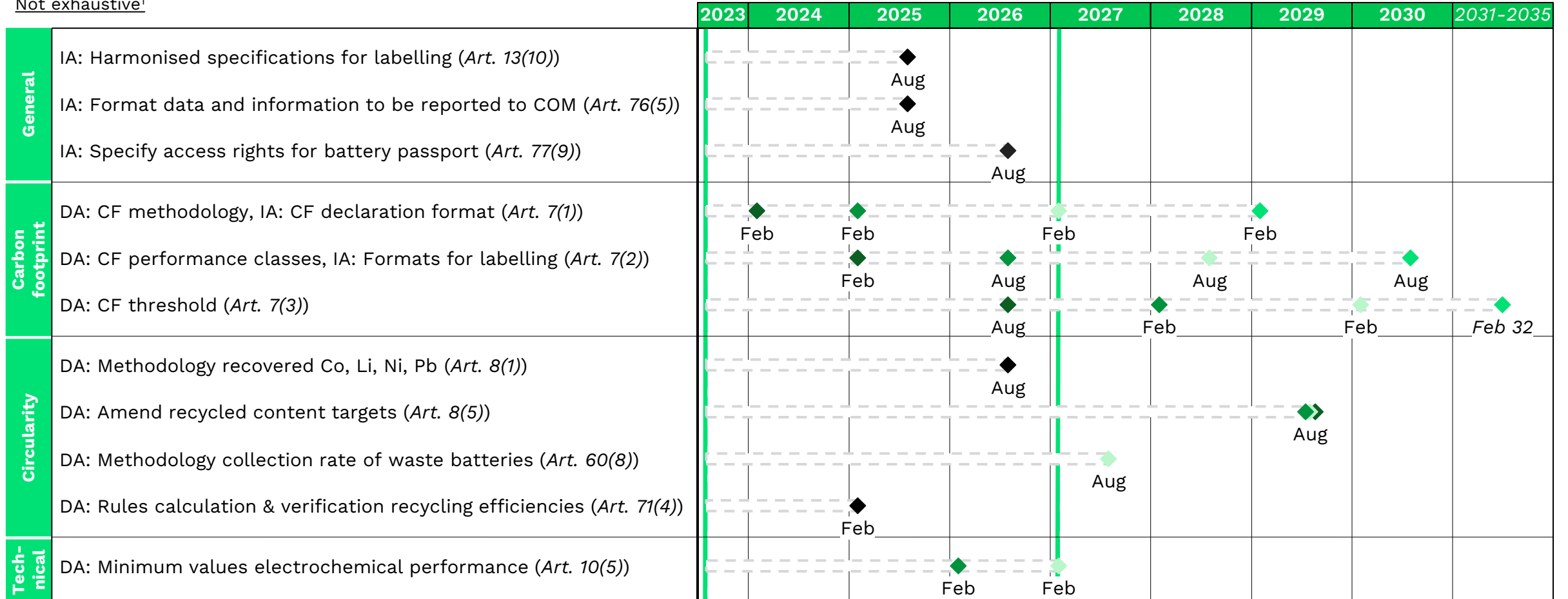
And many more...



# 3 Secondary legislation on the battery passport will run over a decade

**Legend** ◆ DA: Delegated Act ◆ IA: Implementing Act ■ All battery categories ■ EV batteries ■ Industrial batteries > 2kWh except exclusively external energy storage ■ Industrial batteries > 2kWh With external storage ■ LMT batteries

Not exhaustive<sup>1</sup>

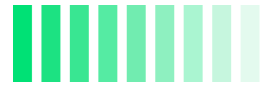


Aug 23

EU Battery Regulation entry into force

Feb 27

Battery passport adoption



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