Battery Pass

thebatterypass.eu

Supported by:

Federal Ministry for Economic Affairs and Climate Action

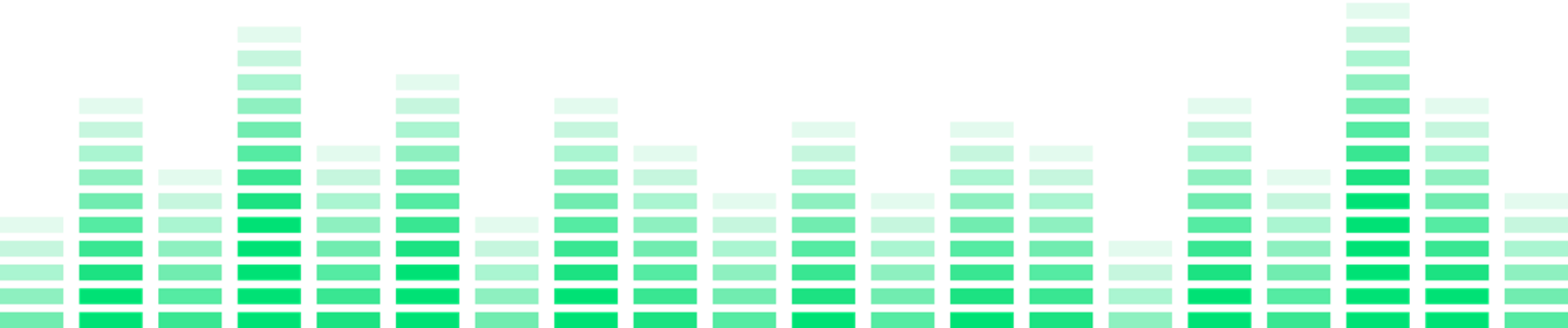
on the basis of a decision by the German Bundestag

Battery Pass Projekt

Von der Mine bis zum Recycler

Batterie Pass Demonstrator mit Lego

QI-Digital Forum Berlin
10.10.2023



The Battery Pass is a consortium of 11 partners co-funded by BMWK aiming to advance the implementation of the EU Battery Passport

Key facts on the Battery Pass Consortium

- Evolved from Circular Economy Initiative Germany (CEID)
- 11 consortium partners
- Co-funded by BMWK with EUR 8.2 mn
- Aiming to advance the implementation of the EU battery passport
- Five work packages:
  - coordination and communication,
  - content standards,
  - technical standards,
  - demonstrator, and
  - value assessment
- 3-years: Apr 2022 to Apr 2025

CONSORTIUM LEAD

SYSTEMIQ

CONSORTIUM PARTNERS

acatech · Audi · BASF We create chemistry · BMW GROUP · Circulor · FIWARE FOUNDATION · Fraunhofer IPK · TWAICE · umicore · VDE RENEWABLES

*under subcontract

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

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

Provide transparency to impact decisions

Enable shift from linear to circular economies

Create a battery level playing field

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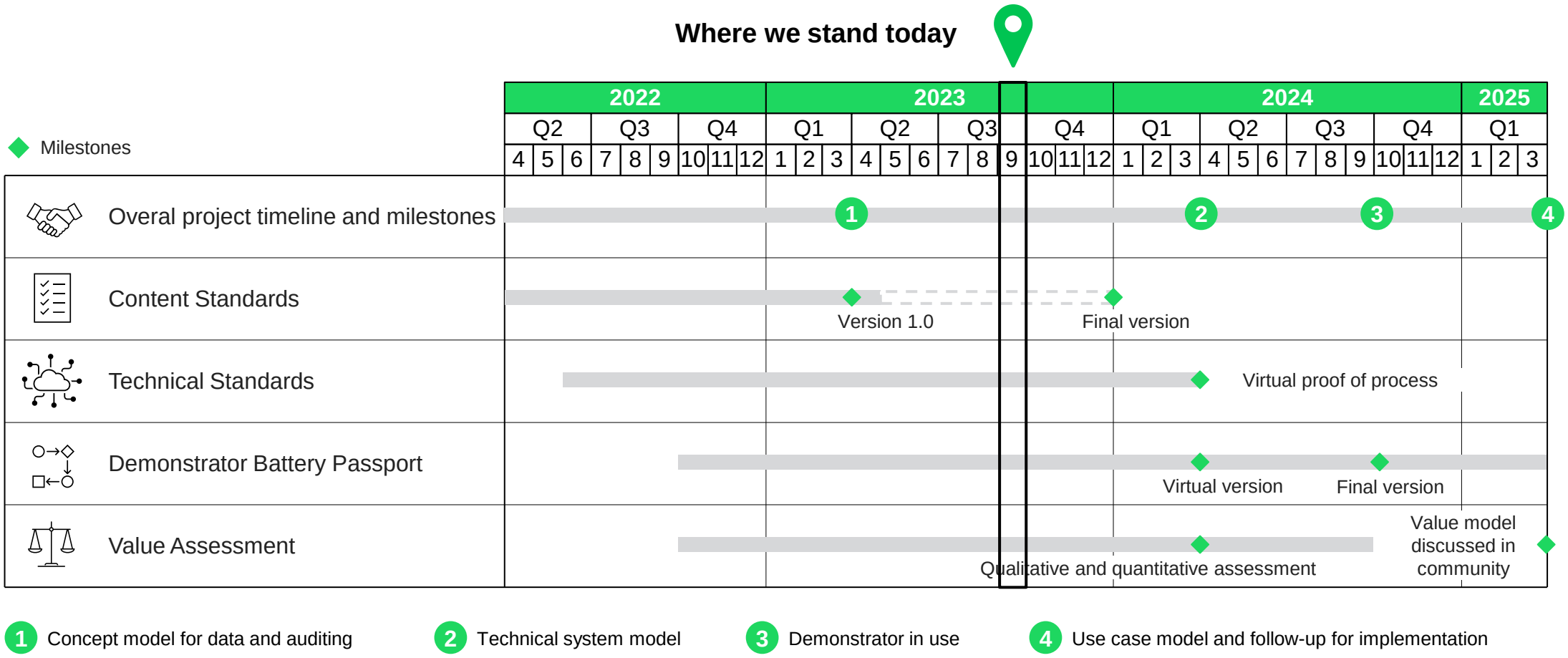
The publication of the Battery Passport Content Guidance (version 1.0) represents the first milestone of the three-year project



1 Concept model for data and auditing

2 Technical system model

3 Demonstrator in use

4 Use case model and follow-up for implementation

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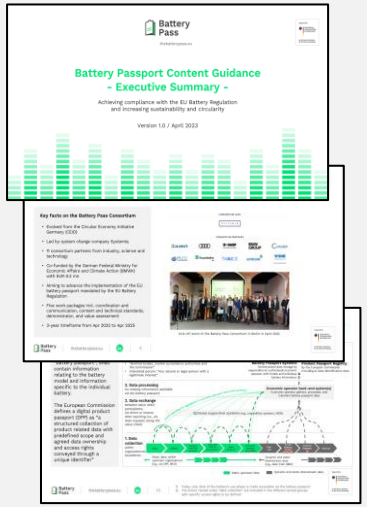
In April 2023, the Battery Pass reached its first milestone with the launch of the Battery Passport Content Guidance at Hannover Messe

Handover of Content Guidance at Hannover Messe

Battery Passport Content Guidance

Comprehensive report
PDF (200 pages)



Executive Summary
Slide deck

Data attribute longlist
Excel file

Available for download on our website

Battery Pass

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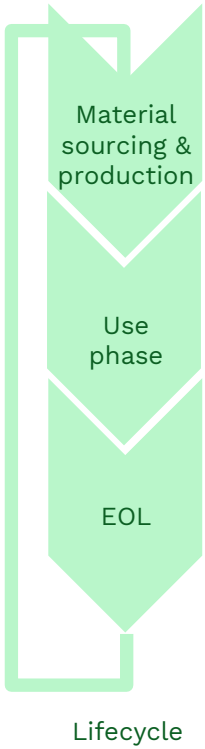
The Battery Regulation is a ground-breaking reform of the EU internal market as it covers the entire life cycle and mandates the first digital product passport in the EU

Scope of the Battery Regulation



Recycled content: Min. levels of **recovered cobalt (16%), lead (85%), lithium (6%), and nickel (6%),** increasing over time

Due diligence policies: **Implementation of a due diligence policy,** incl. traceability or chain of custody system

Performance, durability: **Minimum performance & durability requirements** for batteries will be determined

Waste battery management: **Collection targets** as well as **min. recycling efficiencies** and levels of **recovered Co, Cu, Pb, Li, Ni**

Carbon footprint: **Carbon footprint** reporting required for the first time and for each model per manufacturing plant

Improved data availability: An electronic record of a battery **(battery passport)** with key static and dynamic data

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The battery passport will be mandatory for large batteries from 2027 onwards and is to be issued by the “economic operator” with different access rights

General specifications for the battery passport

Timeline	Q1 2027 (42 months after entry into force of the Regulation)
Scope	
Responsibility	Economic operator (placing the “battery” on the market)
Access	Public Notified bodies Market surveillance Commission Interested persons

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The scope of information to be made available via the passport is extensive with up to 90 data attributes, which can be segmented into seven clusters

Defined data categories are completely independent from the product which make them reusable for other DPPs

Battery Pass

Battery ID: 0101010

General information

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

Labels and certifications

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

Carbon footprint (CF)

- Carbon footprint
- 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

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Besides the battery passport the regulation specifies two other reporting tools for performance and durability data

	Battery passport (Art. 77*)	Document accompanying the battery (Art. 10)	Up-to-date data in battery management system (Art. 14)
Content	• Annex XIII incl. data specified in Articles 10 & 14	• Containing values listed in Annex IV (Part A)	• Data attributes listed in Annex VII -> up-to-date in BMS • Annex VII: Discerns data attributes for different battery categories
Scope	• EV batteries • LMT batteries • Industrial batteries with capacity > 2 kWh	• EV batteries • LMT batteries • Industrial batteries with capacity > 2 kWh	**If battery uses a BMS:** • EV batteries • LMT batteries • Stationary battery energy storage systems
Timeline	• 42 months after regulation in force (Feb 2027)	• 12 months after regulation in force (Aug 2024)	• 12 months after regulation in force (Aug 2024)

*Article 65 in current version of Content Guidance

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The battery passport will unlock major value for several value chain players

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

Miner

Refiner

Precursor and CAM producer

Cell and module producer

Automotive OEM: “digital administrative purposes”

Digitalisation of market conformity and compliance assessment leads to resource savings (e.g., time).

User: “informed purchasing decisions”

Available data supports private consumers and the public sector in making informed purchasing decisions.

2nd hand user: “improved allocation and use”

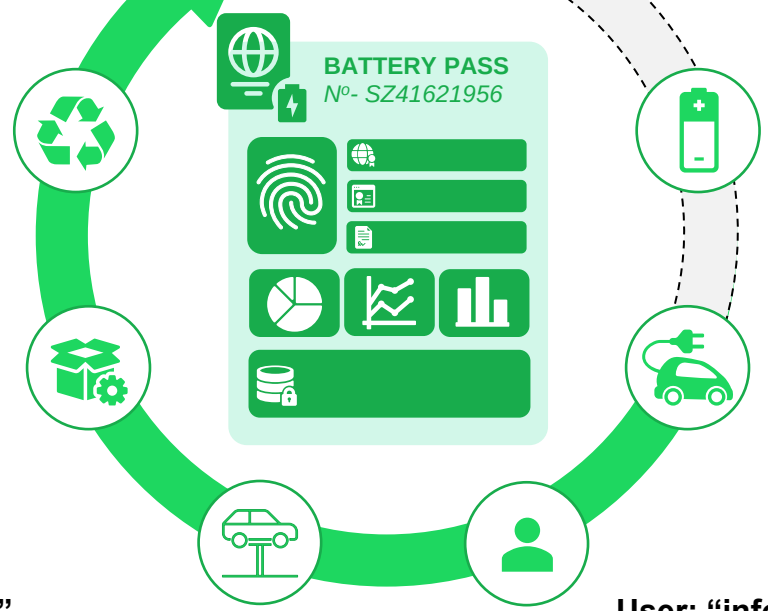
Performance and durability metrics (e.g., SoH, lifetime) enable a more precise allocation in the second life application based on technical data to optimize functionality in second life.

Collector: “effective transport”

Available battery characteristics (e.g., chemistry) and performance and durability information (e.g., negative events) ease the assessment of required safety measures for the transport.

Recycler: “improved recycling”

Availability of data on battery composition and dismantling enables more efficient recycling processes by e.g., reducing sampling efforts and optimizing the dismantling process.



This project receives funding from the German Federal Ministry for Economic Affairs and Climate Action by resolution of the German Bundestag under grant agreement No 16BZF335.

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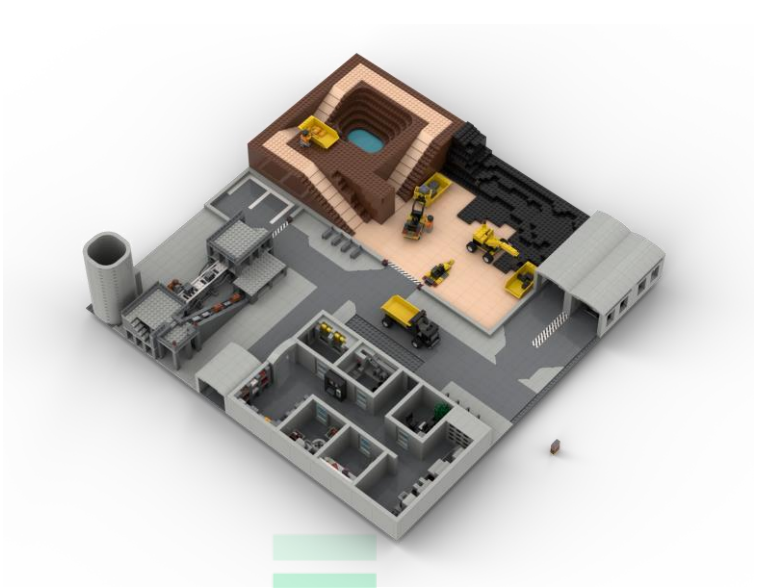
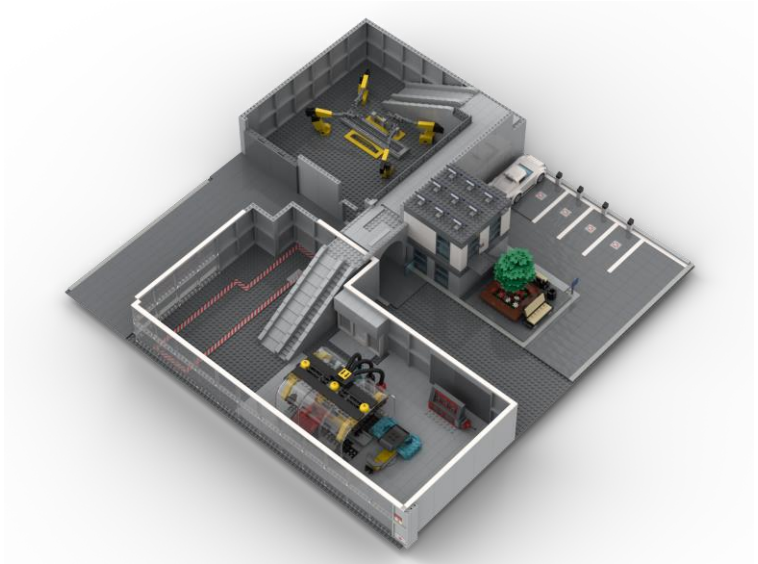
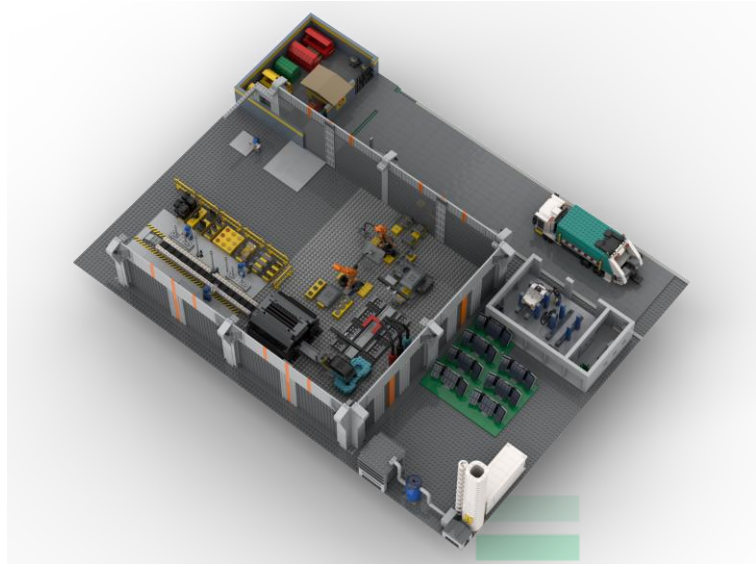
Battery Pass Demonstrator with Lego Bricks



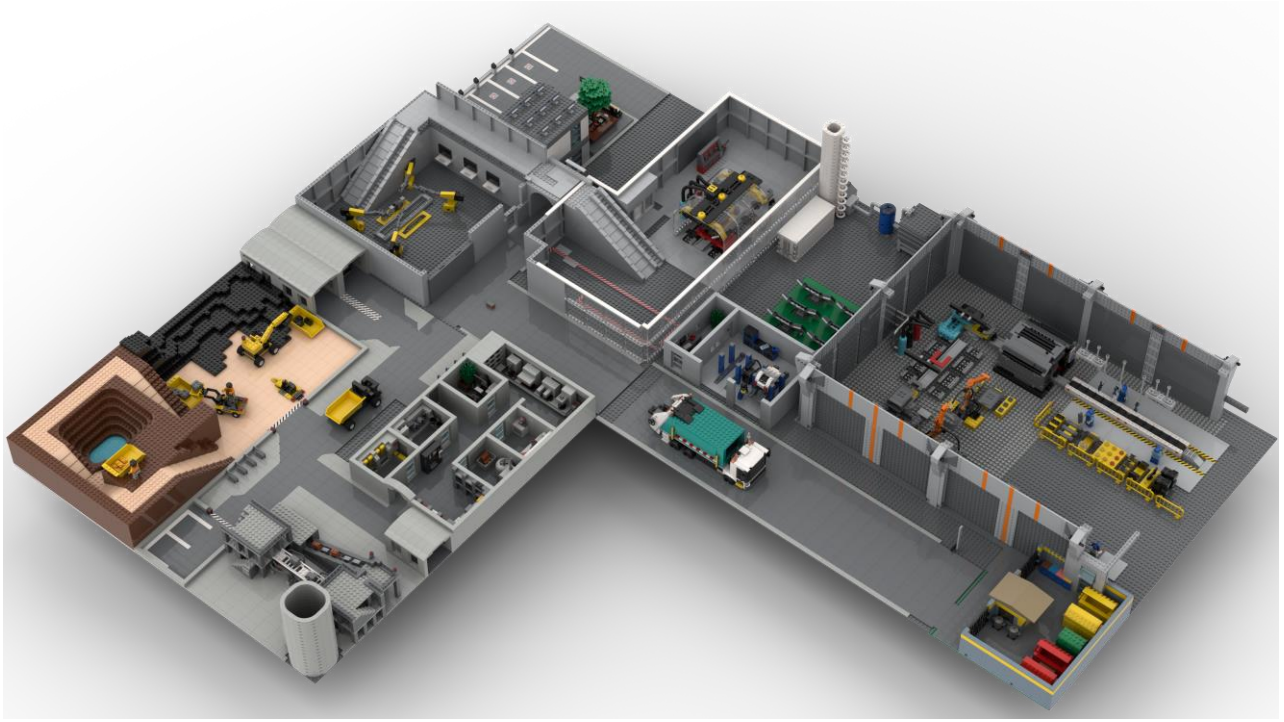




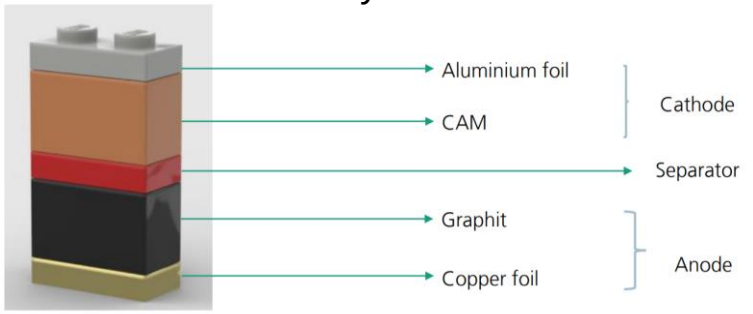
Explanatory accompanying presentation

Purpose of Battery Pass Demonstrator with Lego Bricks

- The Battery Pass is a digital record of a battery that ensures informed decisions of stakeholders along the value chain
- It is a multi-purpose tool to support
  - Socially responsible sourcing
  - Environmentally friendly production
  - Transparency on battery conditions during use phase (e.g. State of Health)
  - Efficient repurposing and remanufacturing
  - Last but not least **Circular Economy** through efficient recycling of raw materials
- The Battery Passport demonstrator with Lego bricks shall provide a tangible view on the abstract concept of the battery pass even for non-experts
- It shall further show the complete circular battery value chain and its relation to the data in the battery passport



Battery Value Chain from the mine to the recycler



Battery Cell with elementary components

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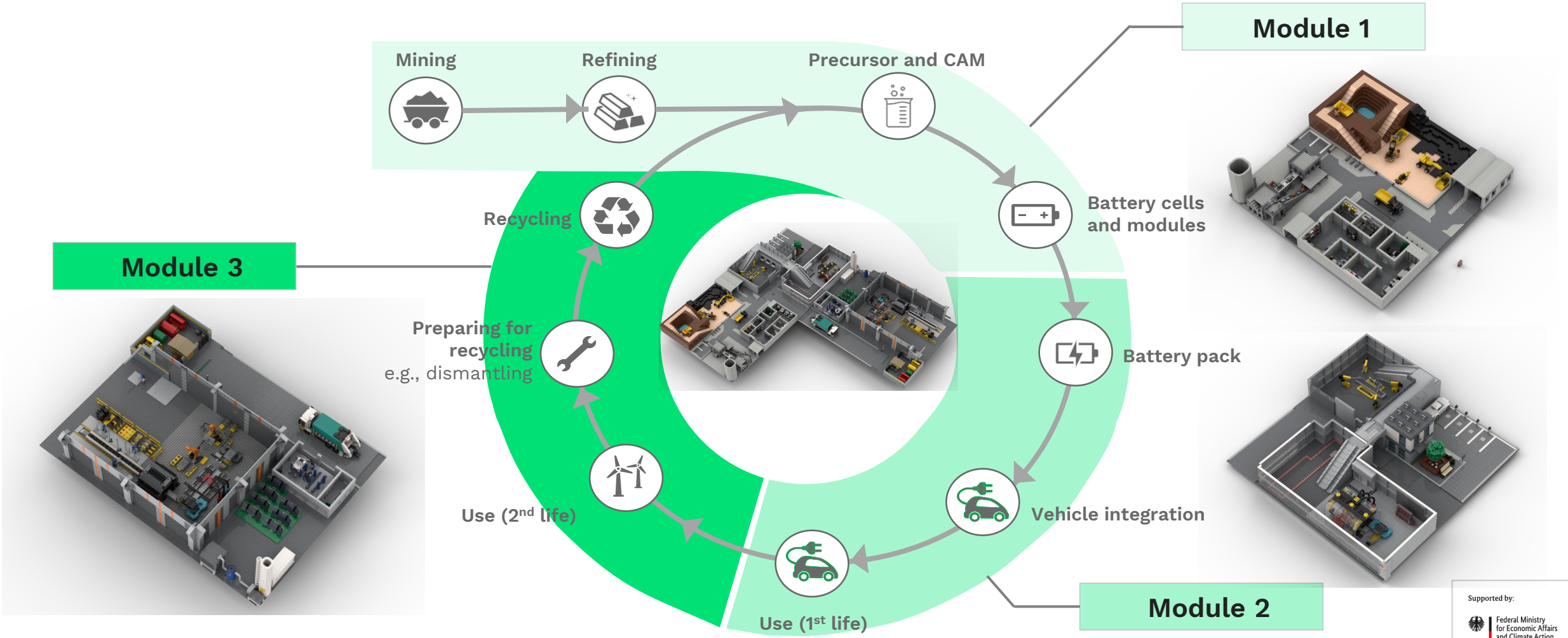
Battery Passport Demonstrator with Lego Bricks

Coverage of complete circular battery value chain



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Raw material extraction (mining)

Situation

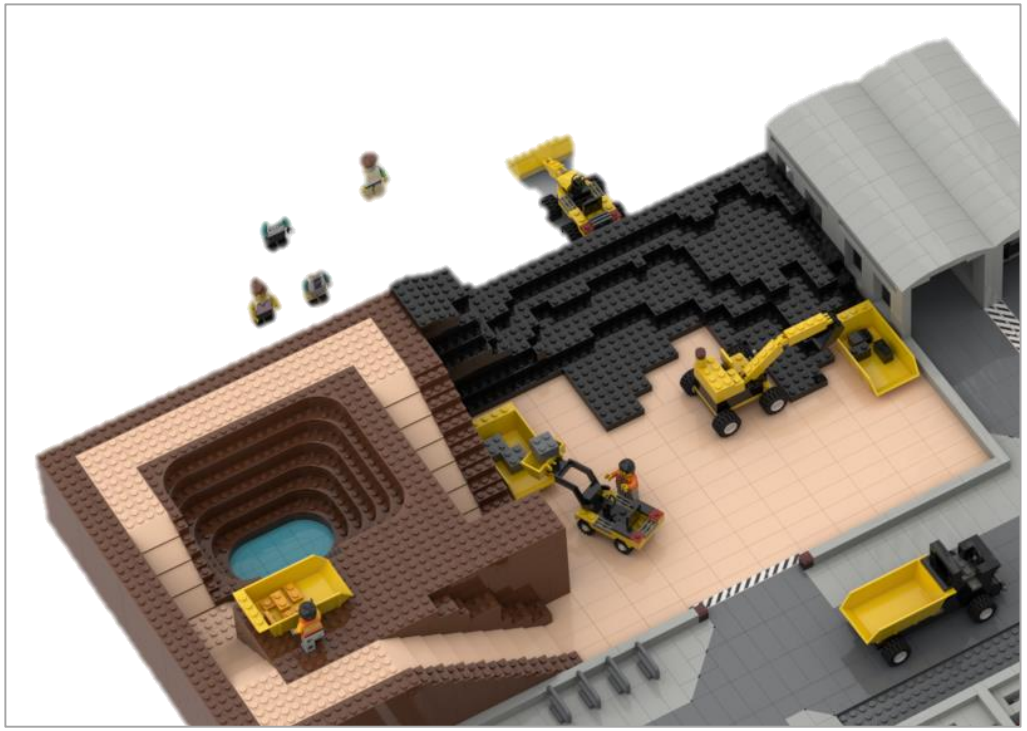
- There are several environmental and social issues associated with mine sites for battery materials like Cobalt, Lithium, Nickel, Manganese, Graphite and others
- The key issues that need to be addressed are:

Environmental Impact (e.g., water consumption)

Human Rights and Child Labor

Solution (via battery passport)

- To address those issues the Battery Passport includes a link to a due diligence report that describes which means the economic operator puts in place to avoid negative social and environmental impacts
- On a voluntary basis further 3rd party assurances can directly be made available through the battery passport allowing the consumer to make conscious buying decisions



Mine-site for battery materials modelled with Lego bricks

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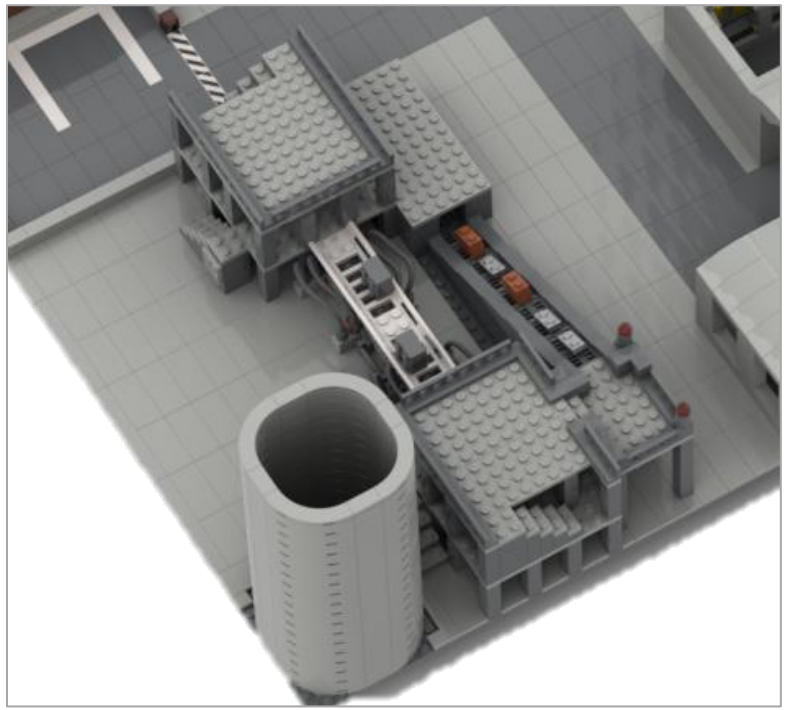
Material preparation (refining)

Situation

- While batteries play a significant role in decarbonising the energy and transport sector, they come along with considerable embedded carbon emissions
- A uniform carbon footprint 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

Solution (via battery passport)

- The Battery Regulation will define a uniform methodology to calculate the battery carbon footprint which will need to be reported in the battery passport differentiated per life cycle stage
- The information for the PCF calculation originates i.e. from primary data gathered through a traceability system for each step in the value chain



Factory for pre-processing of battery materials.

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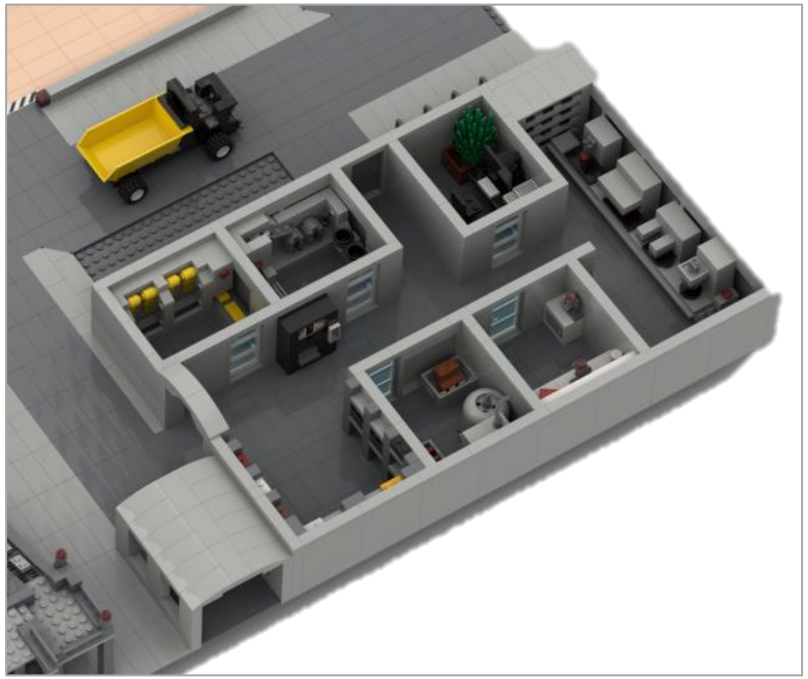
Cell production

Situation

- 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

Solution (via battery passport)

- The battery passport shall include information on battery materials and composition for safe handling and informed decisions
- Furthermore, recycled content needs to be reported



Factory for production of battery cells

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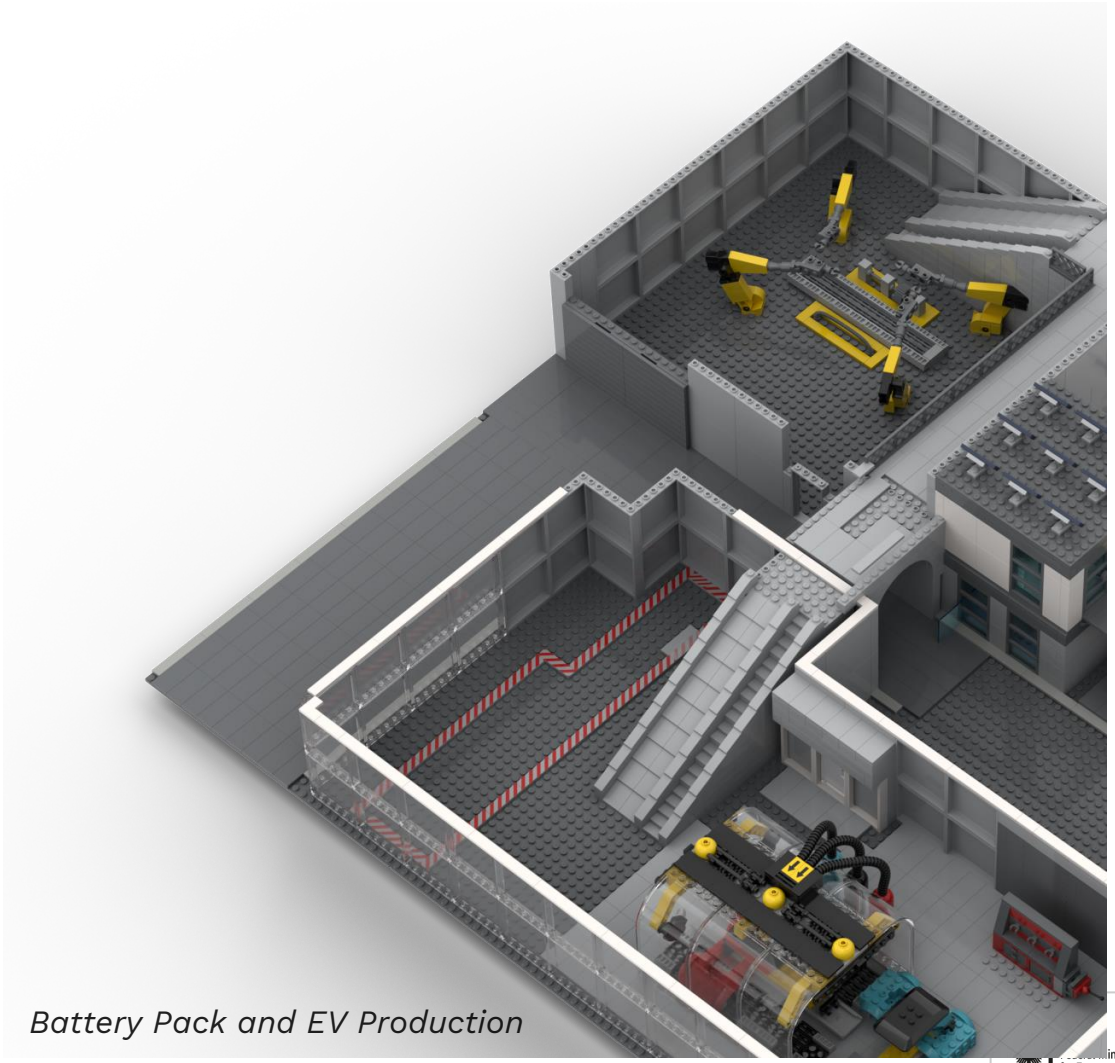
Battery Pack and Electric Vehicle Production

Situation

- The responsibility for issuing the battery passport lies with the economic operator (or an authorized representative) placing the battery on the market or putting it into service
- The economic operator needs to collect the mentioned information from the upstream value chain (supply chain due diligence, product carbon footprint, materials and composition, recycled content) as well as further data (e.g., battery category and weight) ensuring that it is “accurate, complete and up-to-date”

Solution (via battery passport)

- To connect and identify a battery passport with a battery a unique identifier and machine-readable code (e.g., QR) must be used
- The battery passport allows informed purchase decisions for customers by providing relevant information prior to purchase



Battery Pack and EV Production

Ministry for Economic Affairs and Climate Action
on the basis of a decision by the German Bundestag

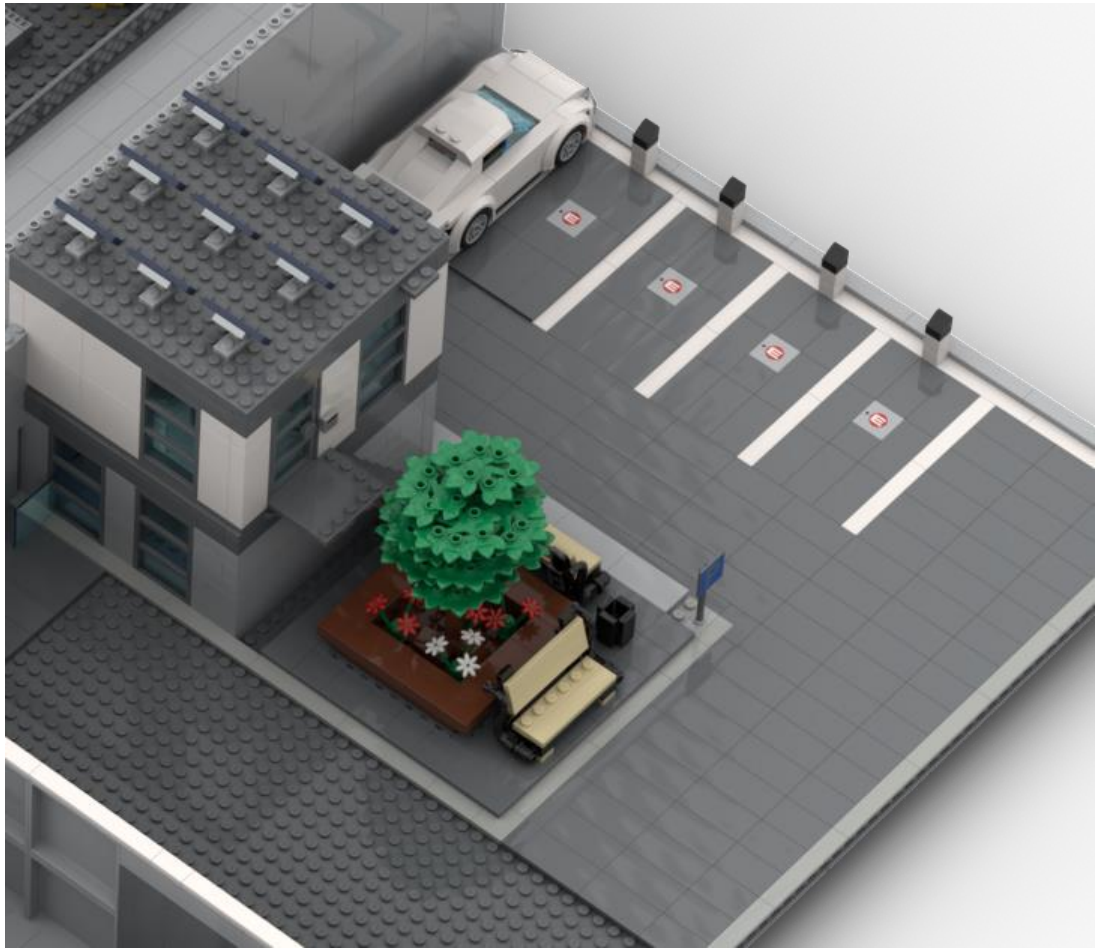
Battery Use Phase

Situation

- During the use phase, the battery is subject to certain wear caused e.g., by the amount of **charge/discharge cycles** or critical temperature exceeds which have, among others, an impact on the **battery state of health (SoH)**
- This information is currently opaque but important for informed decisions on how to reuse or repurpose a battery (see next slide)

Solution (via battery passport)

- The battery passport is a digital record that accompanies the battery over its lifetime gathering performance and durability relevant data
- With the battery passport not being connected to any personal data (e.g., VIN), GDPR is not relevant for publicly available battery passport data



Electric car at charging park and building with solar panels and energy storage

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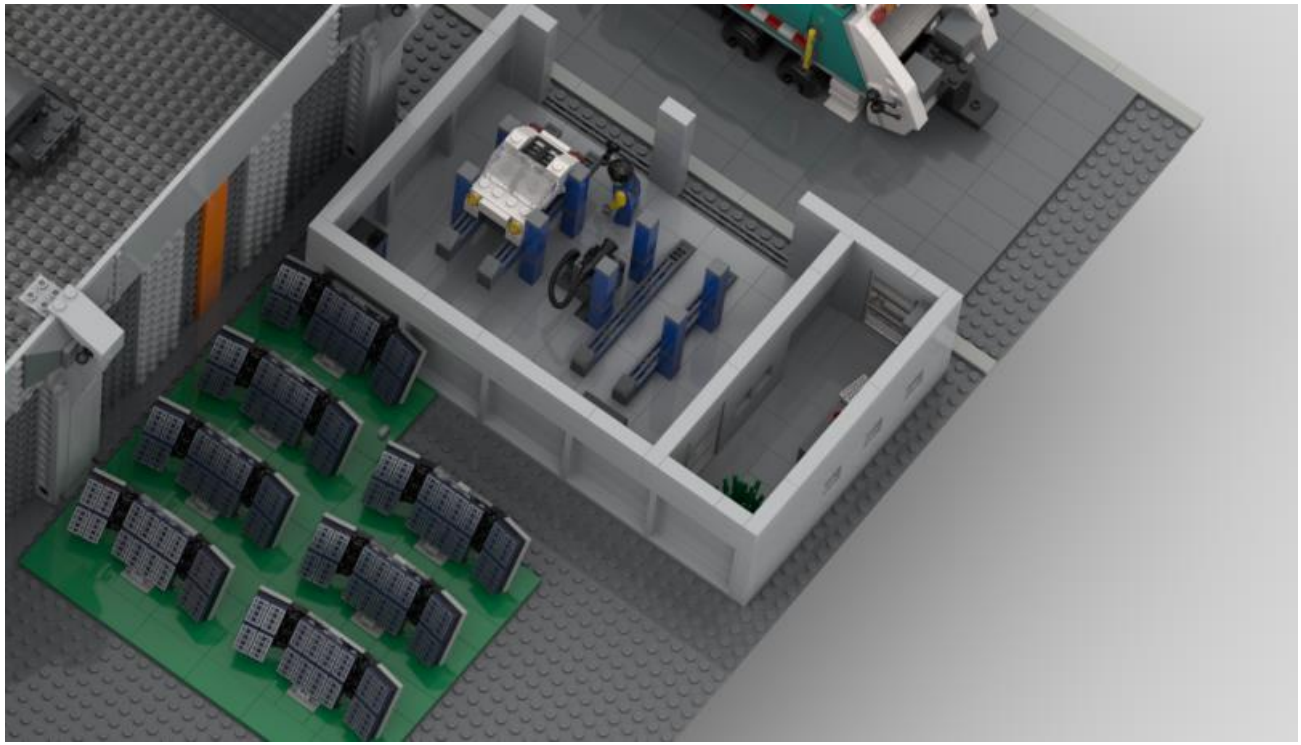
Battery Remanufacturing / Repurposing

Situation

- To efficiently decide if a battery should be **remanufactured, repurposed or recycled,** specific information about the battery is required
- With some of this information being sensitive, it should only be disclosed to persons with a legitimate interest

Solution (via battery passport)

- The battery passport includes mechanisms to allow access to certain battery passport data for certain access groups only / by restricting public access
- In case of remanufacturing and repurposing of a battery, a new battery passport will be issued by the repurposer or remanufacturer as a new economic operator



Verify battery of electric car for repurposing and solar panels charging a stationary energy storage

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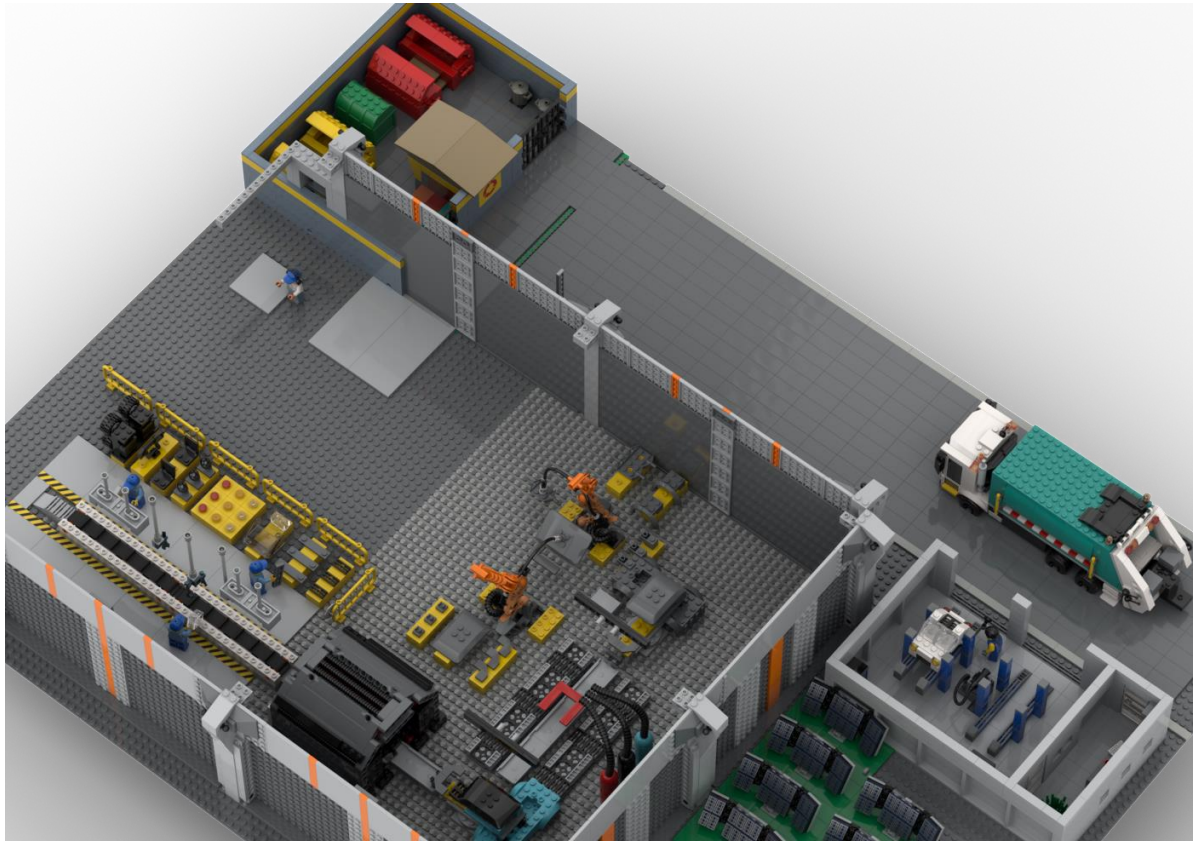
Battery Recycling (closing the loop)

Situation

- Considering limited resource availability and geo-political independence, a battery reaching its end-of-life **should be recycled** in order to feed its raw materials back into production of a new battery
- Today, only limited information on the design and composition of a battery is available resulting in high cost or low efficiency

Solution (via battery passport)

- By providing detailed information on removal and dismantling as well as battery composition, the battery passport **increases the efficiency of recycling processes**
- Aggregated battery passport data allows verification and control of **circular economy** as well as **market surveillance**



Automated dismantling of battery, recycling of raw material and transport to cell production

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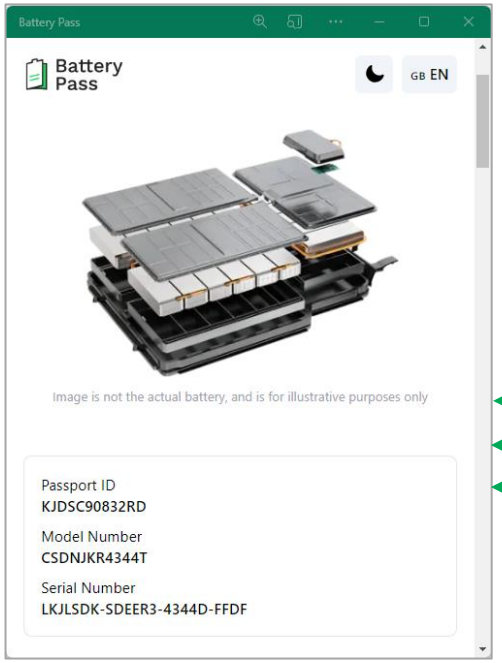
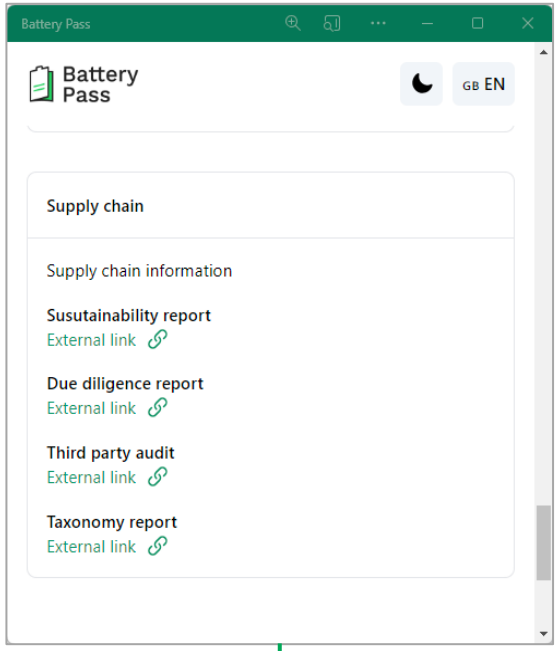
Software demonstrator under development

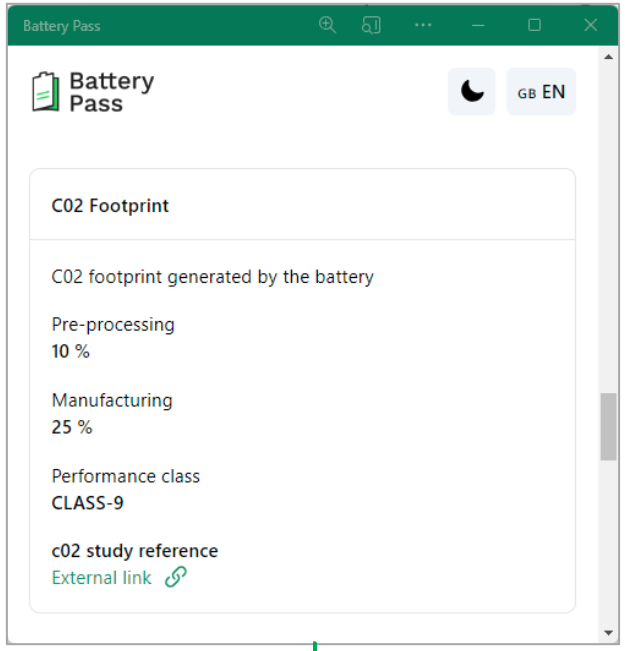
Battery pass with ID



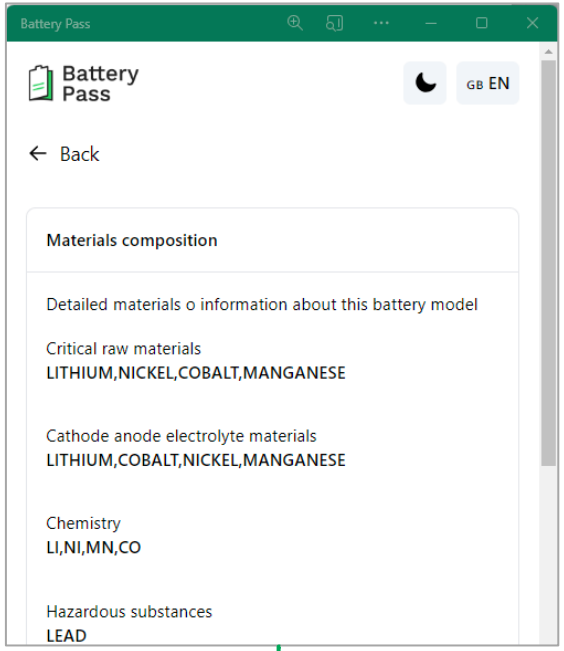
Mining



Refining



Cell production



- Frontend and backend are currently tested within the consortium
- Already with the possibility to add information from external companies
- Target: TRL 5 until February 2024

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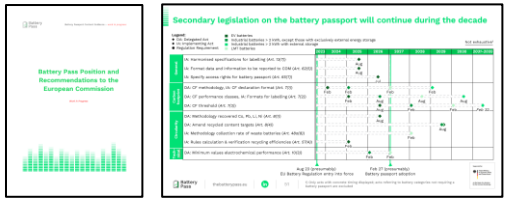
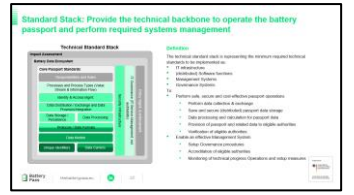
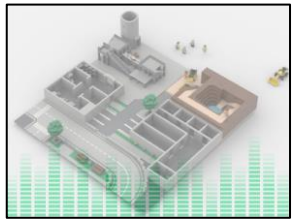
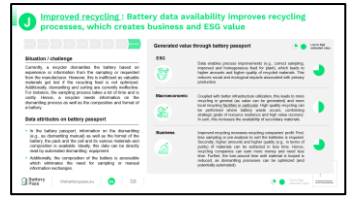
Please contact us if you have additional questions

This project receives funding from the German Federal Ministry for Economic Affairs and Climate Action by resolution of the German Bundestag under grant agreement No BZF335.

The Battery Pass proceeds on its project timeline with a perspective on the technical system and value of the passport by March 2024 – stay tuned!

Work packages	Activities	Exemplary analysis
Content Standards	• Update of the Content Guidance until end of the year • Position paper towards the European Commission • Involvement in the secondary legislation process • Knowledge sharing with other initiatives	
Technical Standards	• Finalizing a first draft reference model, an overview on required and existing standards as well as architecture options • Conduct an external consultation phase in Sep/Oct 2023	
Demonstrator	• Display a first module of our physical BP demonstrator at DKE Innovation Campus as well as the complete version at IAA Mobility • Continue integration efforts with Catena-X/ EES/ Gaia-X • Develop the first software demonstrator (TRL5) until Feb 2024	
Value assessment	• Launch an external consultation phase in July on an initial use case longlist • Continue working on detailed descriptions of individual use cases • Quantify the impact of select prioritized use cases until end 2023	

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