



AVL Digital Battery Passport launch

CO₂ Engineering With a Blockchain-Secured
Data Platform to Ensure Compliance

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Today's Presenters



Martin Rothbart

Senior Product Manager
Energy & Sustainability
AVL List GmbH

23 years of experience in
automotive industry

5 years responsible for business
development und lifecycle
sustainability



Patrick Lamplmaier

Chief Technology Officer

Tributech

18 years of experience in the
fields of renewable energy and
automation systems

10 years of experience as CTO in
the development of IoT, data and
security platforms



Udo Schulz

Senior Product Manager
Process Automation Portfolio
AVL Analytical Technologies GmbH

15 years of experience in Software
Product and Portfolio Management
of process automation applications

5 years' experience in product
lifecycle sustainability

Today's Agenda

1 Introduction

2 Current Situation and Legal Context

3 What Is the Digital Battery Passport (Dbp)

4 Technical View on the DBP

5 Hands-on View on the DBP

6 Best Practice: DBP in the Battery Innovation Center

7 The AVL Solution

8 Summary



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About Us

AVL at a Glance



1948

Founded



26

Countries Represented



11,200

Employees Worldwide



11 %

Of Turnover Invested in Inhouse R&D

75

Years of Experience

45

Global Tech and Engineering Centers

68 %

Engineers and Scientists

2,200

Granted Patents in Force

Tributech at a Glance

Founded in 2018 & HQ in Austria

Funded by the Austrian government and out of stealth in 2022 after 100k+ engineering hours.

Patented data security technology

Patent for data notarization technology that offers a highly scalable data integrity solution.

Global adoption across industries

In EU, UK, US and Middle East and applied across industries (e.g. energy, manufacturing, automotive)

Trusted by global industry leaders

Industry leaders' partner with Tributech to build the next gen of secure digital platforms





AVL Digital Battery Passport Launch

Introduction

Our Mission and Vision

Clean. Affordable. Connected. Intelligent.

We provide leading technologies and superior services to our customers for a greener, safer, better world of mobility.



Why Is AVL Engaged in the Digital Battery Passport?



Driven by our **passion for innovative solutions**, our vision is to achieve **climate-neutral mobility**

75 years of regulation understanding and **translation** to automated **software applications**

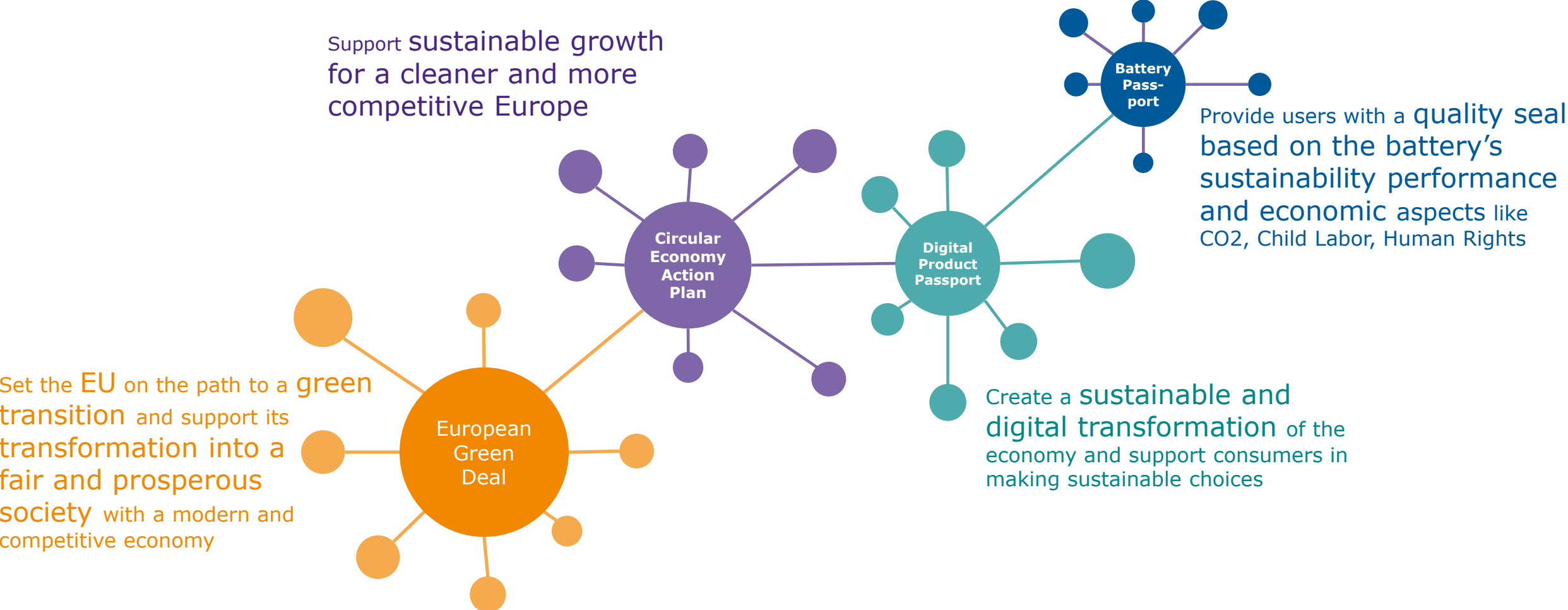
Own **application Know How** in processes like **Battery Production** used in **AVL's Battery Innovation Center**



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Current Situation and Legal Context

The Battery Passport in Context of the European Green Deal





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What Is the Digital Battery Passport (Dbp)



What Is a “Digital Battery Passport”

Legal requirements

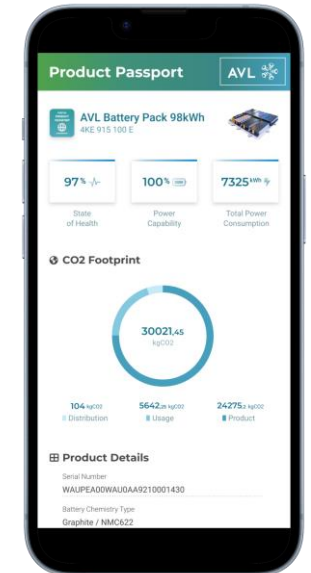
- The Digital Battery Passport is a requirement deriving from the new EU Battery Regulation. It is tool meant to increase transparency and data availability to **responsibly manage global battery value chains**.

Definition

- The Digital Battery Passport establishes a **digital twin** of the physical battery. It is a document that stores relevant **battery data through the entire battery lifecycle**, containing detailed information about a battery’s product, testing and recycling.
- **All stakeholders across the battery value** chain need to collect and share relevant data.
- **All EV and industrial batteries on the EU market** will require a unique battery passport retrievable using the unique product identifier in the form of a QR code.

Content

- **Identification:** A clearly visible and secure unique serial number
- **Battery characteristics:** Information on production date, type and model, chemical composition and CO2 footprint.
- **Statistics on performance and durability:** Technical information on the battery lifecycle must be updated by parties conducting repair or repurposing of the battery and include details on how the data was obtained.

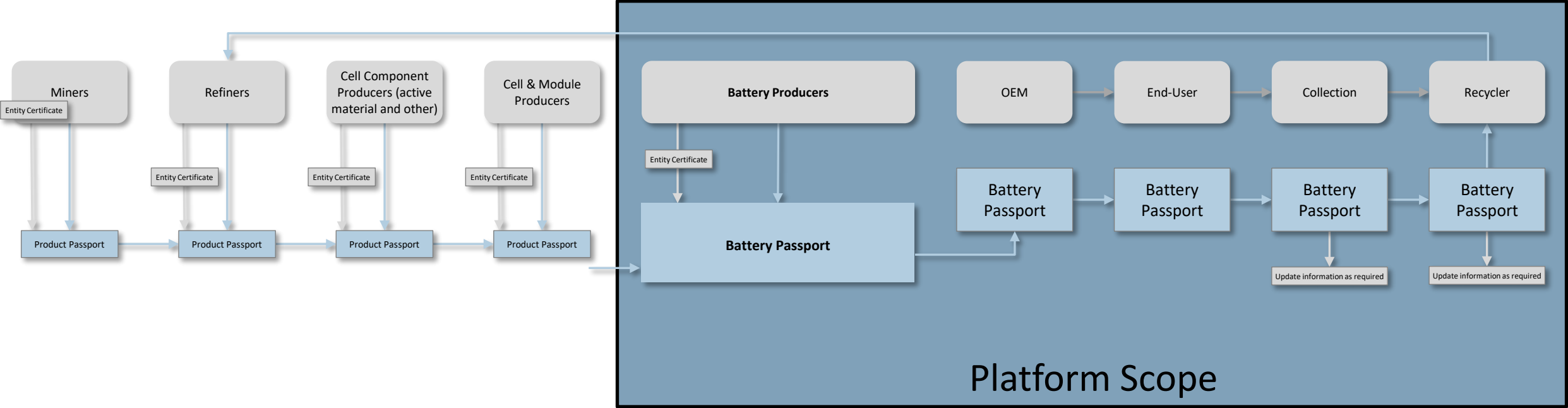




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Technical View on the DBP

AVL Digital Battery Passport Scope

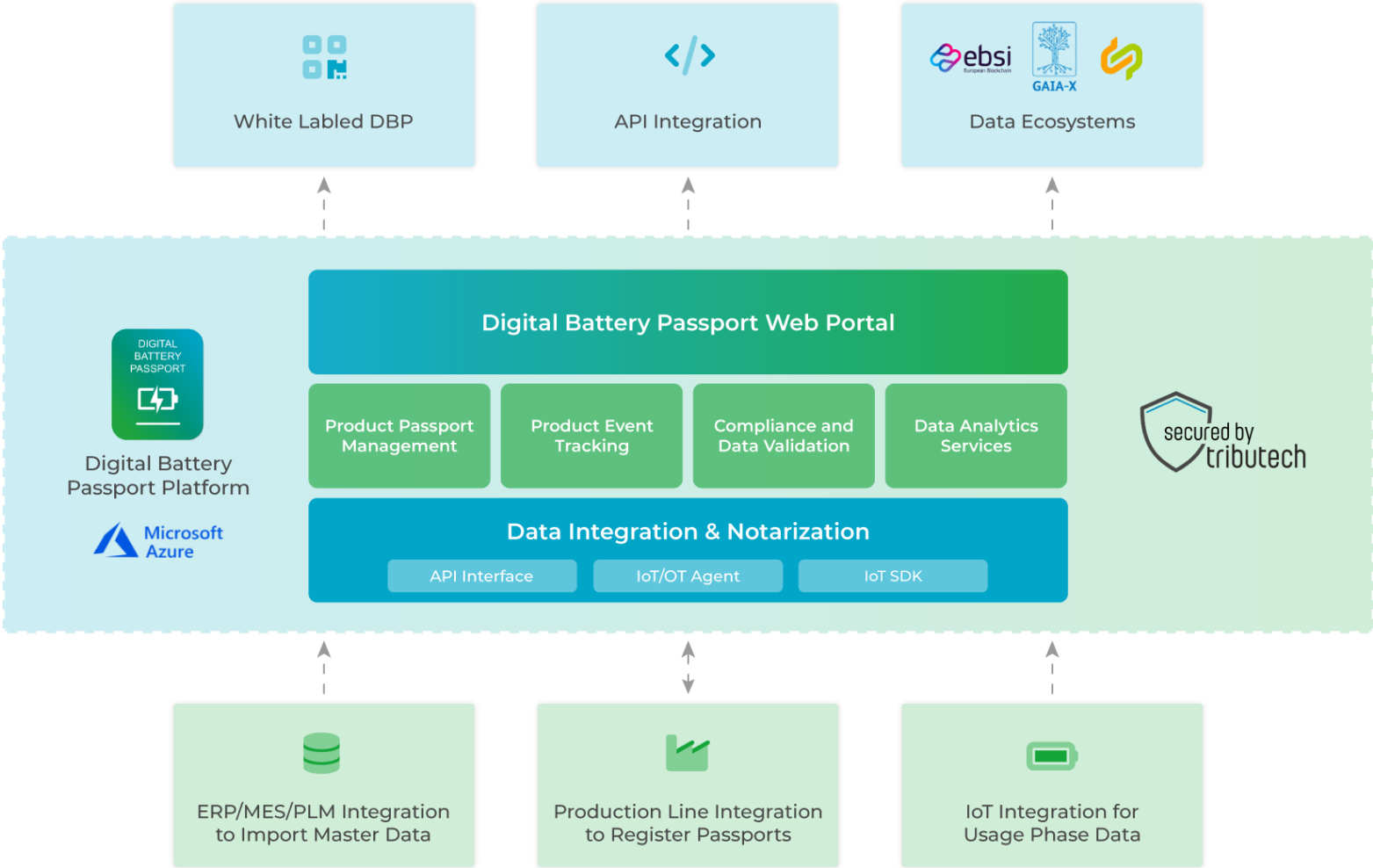


Identified Key Challenges of Implementing of DBP

- Translating regulatory requirements into technical specifications and monitoring changes or new requirements.
- Achieving fine-grained tracking of CO2 footprint and data quality ratings at a product level.
- Integrating and harmonizing data from diverse systems presents a significant complexity.
- Ensuring data integrity and quality as well as establishing trust in collected data among external parties.
- Automating the generation of the Digital Battery Passport and validating data and compliance.
- Managing data access to align with both regulatory mandates and stakeholder requirements



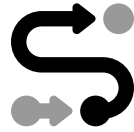
AVL Digital Battery Passport Architecture



AVL Digital Battery Passport Core Features



Product type
management



Automated DBP
generation



Product event
tracking



Fine granular CO2
footprint tracking



Validation and
Compliance Rules



Blockchain-based data
notarization



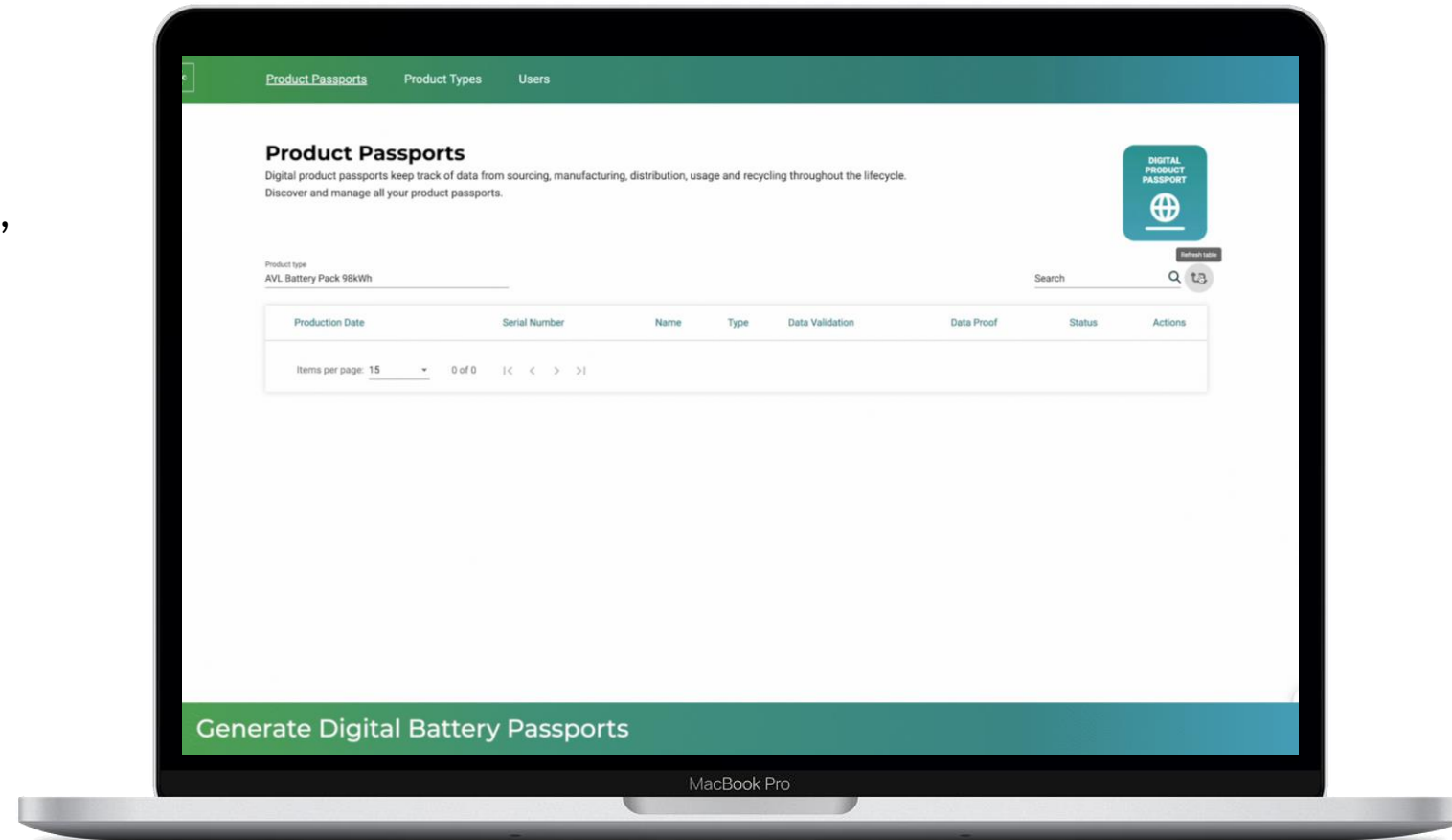
White label DBP end
user application



Integration with
IT/OT/IoT systems

How it Works

- 1 Connect data sources (from manufacturer, suppliers and IoT systems)
- 2 Validate and notarize data to ensure compliance and security
- 3 Generate digital passports in a fully automated and saleable way
- 4 Provides access and distribute data to relevant stakeholders

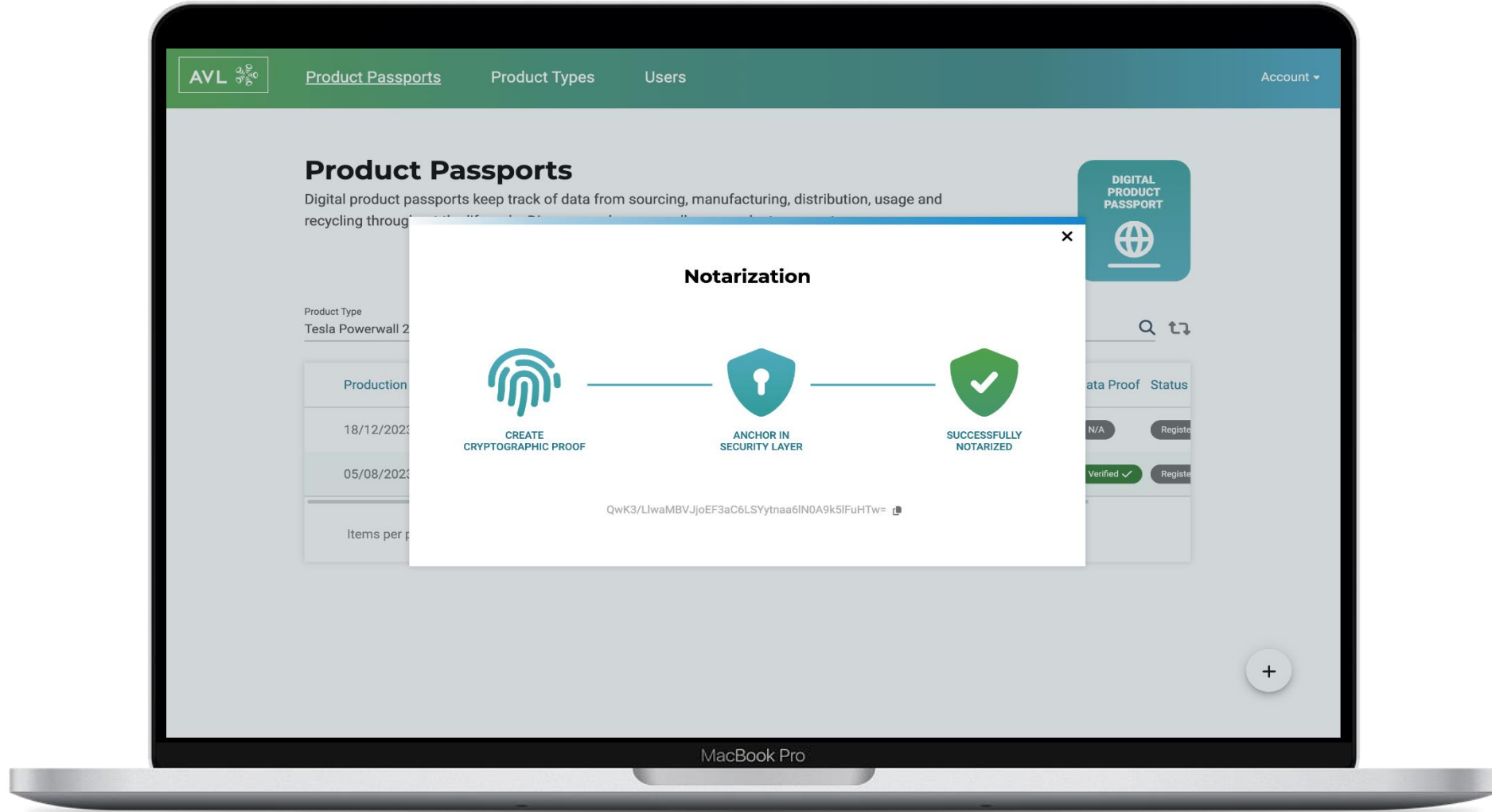




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Hands-on View on the DBP

Live Demo

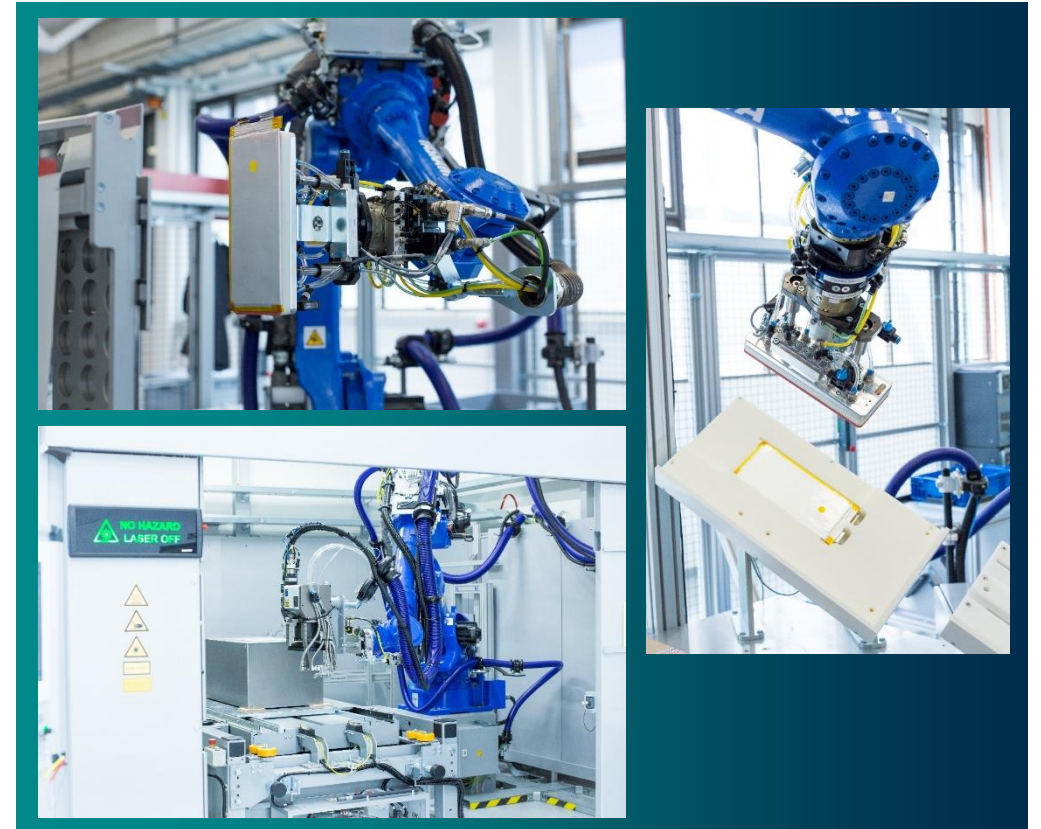




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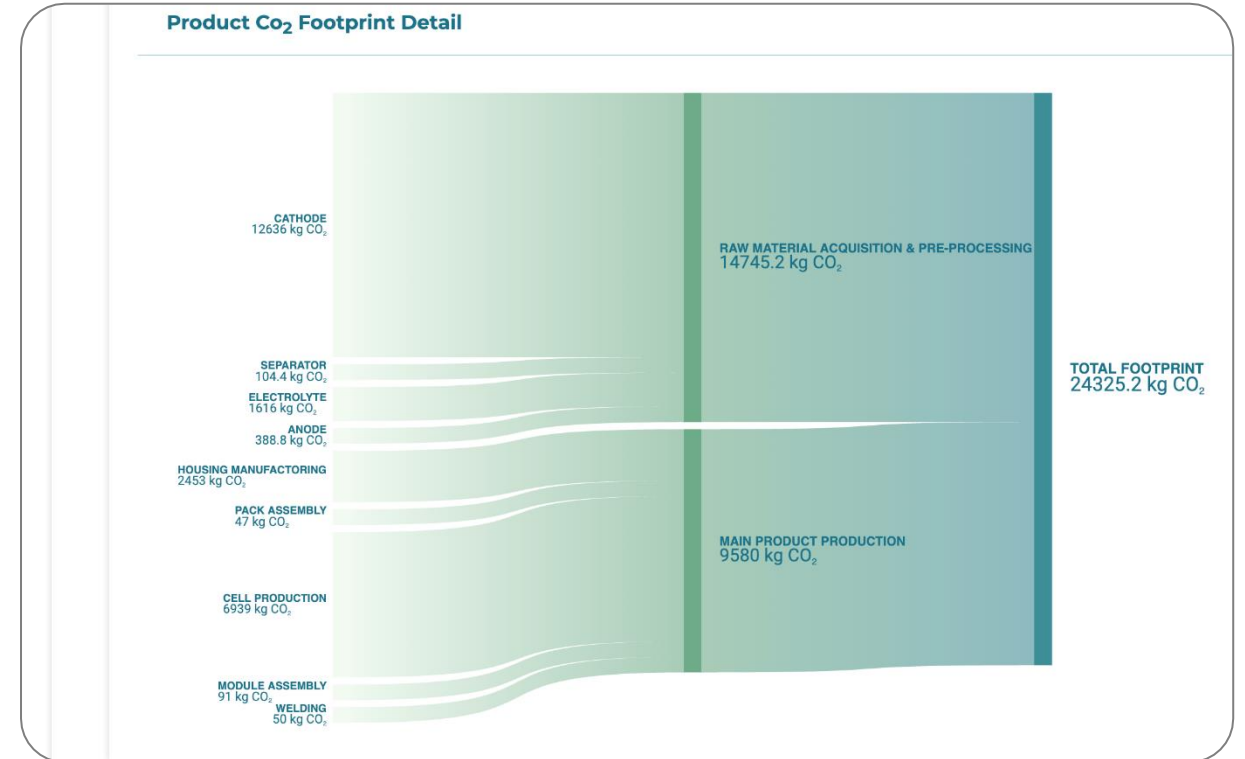
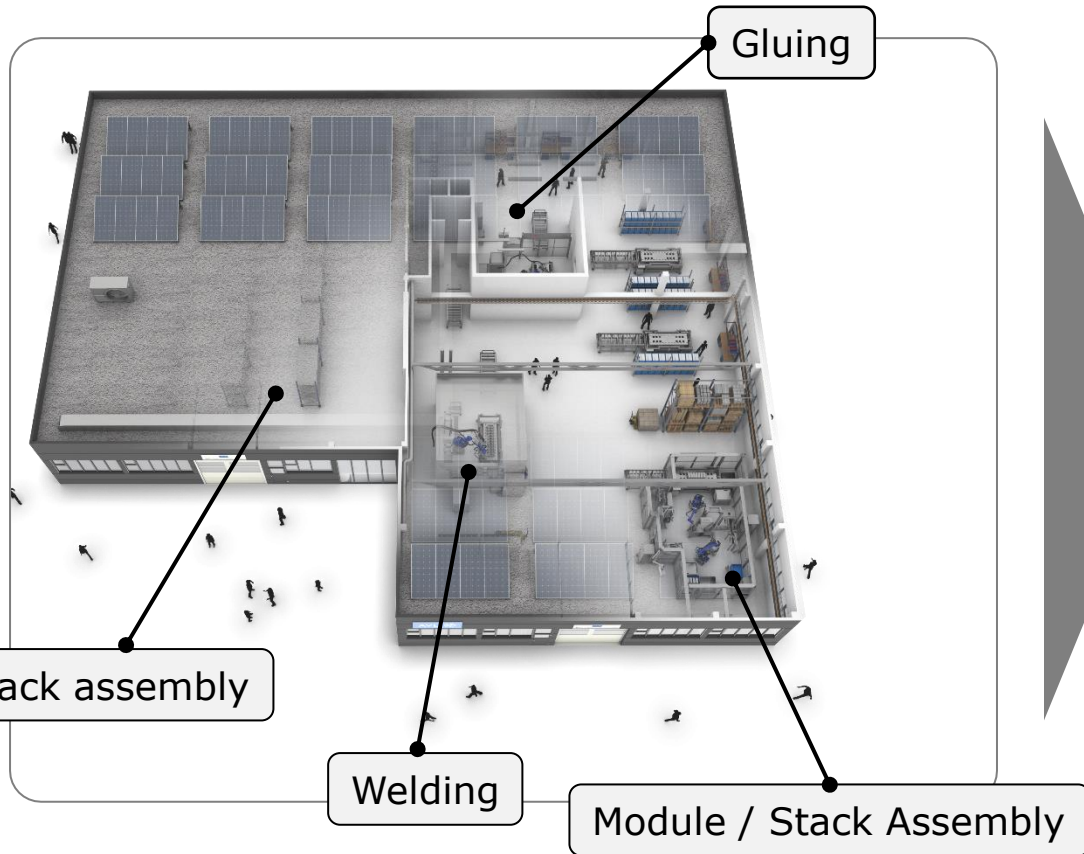
Best Practice: DBP in the Battery Innovation Center

Implementation: AVL Battery Innovation Center (BIC)



Research on the future of battery production → CO₂ equivalent is a main parameter
Measurement of energy, CO₂ equivalent and harmful gaseous emissions

Energy and CO₂ Measurement at Each Station in the BIC



- Integration of measured values in CO₂ modeling
- Digital-twin for energy- based control & scheduling of production

- Direct link of time-based measured values to the battery passport
- Application of manufacturing CO₂ to the total footprint value



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The AVL Solution

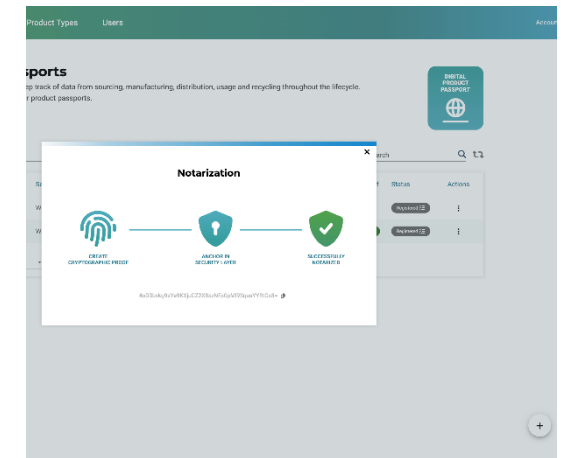
The AVL Digital Battery Passport Portfolio

Infrastructure and hosting

Consulting & value-added services

Integration services

Platform and application



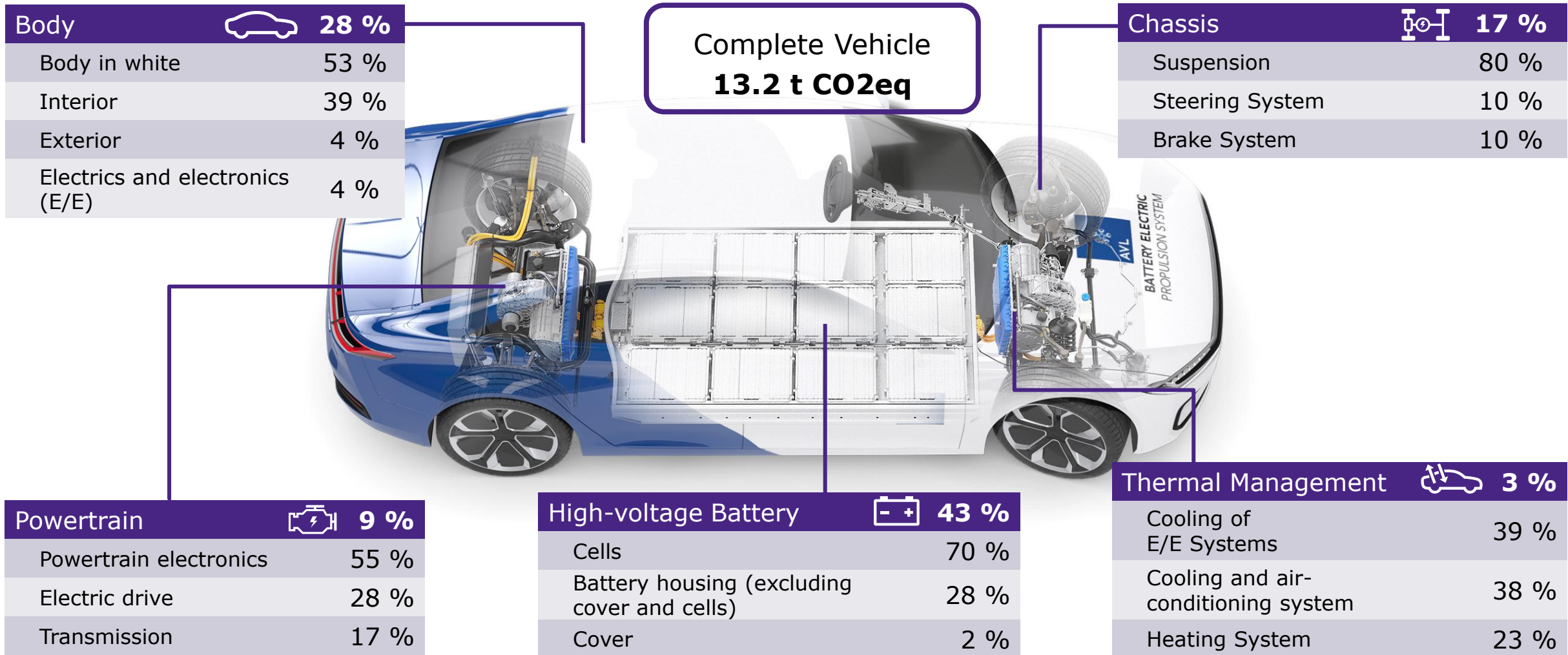
AVL Digital Battery Passport Benefits

- Complying with EU Battery Passport Regulation
- Reducing efforts for data acquisition & analytics
- Controlling security & compliance risks
- Building on a future proof system for fine granular reporting
- Managing Master Data
- Protecting data by Blockchain technologies
- Integration into IoT/IT/OT systems
- Compatibility to different data eco-systems (Catena-X, Gaia-X)



Outlook Beyond Batteries

Digital Battery Passport for Complete Vehicles



Source: T. Schmid et.al, 2024, "Design to CO2eq - The Reality Check", ATZ 02-03/2024



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Summary

AVL Digital Battery Passport Summary

EU regulation

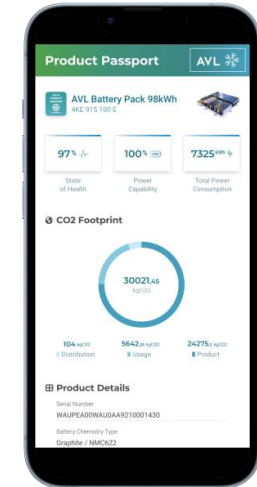
- ✓ The Digital Battery Passport is a **requirement** deriving from the **new EU Battery Regulation**.
- ✓ The regulation will come **into force** by early **2027**.

AVL Battery Passport

- ✓ **Connect** data sources
- ✓ **Validate** and notarize data
- ✓ **Generate** digital passports fully automated
- ✓ **Provide access** to relevant stakeholders

Customer benefit to start with AVL now

- ✓ Get a **regulation compliant** battery CO₂ footprint and passport
- ✓ Become an **earlier adopter** of the regulation
- ✓ Be a sustainable **innovation leader** for battery electric mobility



The passport
in your pocket

AVL has the only fully operational digital battery passport in a productive environment



AVL Digital Battery Passport Launch

Q&A

Contact



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Thank you



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