Battery Passport and where to find them

Getting the general ID: what projects are supporting the development of the Battery passport

BATTERY PASSPORT
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- carbon footprint
- origin of materials
- composition
- end of life treatment
- tracking and tracing

BEPA
Batteries European Partnership Association

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GETTING THE GENERAL ID: WHAT PROJECTS ARE SUPPORTING THE DEVELOPMENT OF THE BATTERY PASSPORT?

The adoption of the Battery Regulation by the European Parliament on 14 June 2023 will prove to have a profound impact for the battery industry in Europe and beyond. At the same time, this also marked a milestone for a group of technologies grouped under the moniker of Digital Product Passports (DPPs), as it's the first time a DPP is integrated in a piece of legislation. The goal of DPPs is to gather information on a product, its production process and the supply chain feeding into the product. Building on the development of blockchain and other distributed ledger technologies, DPPs allow to store all this information in a secure and distributed manner, while enabling users to easily access the specific information they need.

THE EUROPEAN BATTERY PASSPORT

Figure 1- BEPA Battery Passport

A DPP for a battery is generally referred to as a battery passport and it is under this name that it has found a place in the Battery Regulation. The main goal of the European battery passport is to enhance transparency along the value chain. According to the Regulation, once implemented it shall:

- *enable tracking and tracing of batteries*
- *Provide information about:*
  - *the carbon intensity of their manufacturing processes*
  - *the origin of the materials used and whether renewable material is used*
  - *the composition of batteries, including raw materials and hazardous chemicals, about repair, repurposing and dismantling operations and possibilities*
  - *the treatment, recycling and recovery processes to which the batteries could be subject to at the end of their lifetime*

The Regulation points out that not all information stored in the battery passport should necessarily be public. Sensitive commercial information could be limited to those people who have a legitimate interest and information on individual batteries, for example location data during use phase. Test reports shall also be accessible to the official bodies tasked with following the batteries. While the battery passport can ease the life of market surveillance authorities, but will not replace market surveillance as such.

Chapter IX of the Regulation provides more details and states that all industrial batteries bigger than 2kWh and all EV batteries should receive an individual battery passport which should be accessible via a simple QR code. It also stipulates that it is the economic operator who is placing the battery on the market (stand-alone or as part of a vehicle) that needs to ensure an accurate, complete and up-to-date battery passport.

OPPORTUNITIES EVERYWHERE

The minimal requirements laid down by the European Commission for the battery passport are only the start. Once the battery passport is up and running, battery producers can add additional information to further enhance the spread of information across the value chain. All this information embedded in the battery passport has the potential to create additional value. This can be done either through reducing inefficiencies in the current value chains through better exchange of information between stakeholders, or by creating entirely new revenue streams based on the smart use of the embedded information. The battery passport can be a driver of change along the entirety of the battery value chain and for battery producers, supplies and customers alike.

KEY QUESTIONS ON THE TABLE

Now that the framework has been laid out in the Battery Regulation, the next step is to develop fully fleshed-out DPPs that can deliver on their promise. However, there are still a few questions that need to be answered and several (piloting) projects are under way to answer them. Roughly, these projects seek to answer one or more of the following four questions:

What kind of content needs to be stored in the passport?

The minimal requirements for the information stored in the battery passport are laid down in the EU Battery Regulation. But what are the best indicators to show this information?

On top of the minimal information much more information could be added. What is useful to add? Can we arrive at a stakeholder consensus on what other information is useful?

What is the <u>technological framework</u> to allow verified content for the passport?
This question centres on the IT-tools used and the underlying protocols to ensure that verified information on the ground is transposed well into the digital passport.

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How do we <u>define (and calculate)</u> the content we want to store?

Some indicators that are mentioned above are not straightforward and require intricate calculations that might rest on several assumptions. This question tries to come to transparent calculations for these indicators which are supported by a broad group of stakeholders.

Who can _access_ what has been stored and under what conditions?

In the battery regulation there are several levels of accessibility: public information, information for those with a legitimate interest and information that's only accessible for regulators. Who has a legitimate interest? And how can battery producers control who accesses this information.

The various ongoing projects tackle these questions tackle these questions either for the entire value chain, or for a very specific part of the value chain. It can therefore be difficult to see the forest for the trees. In the sections below, you can find a short outline of some of the ongoing projects. The overview is far from exhaustive, as there are also many more private initiatives, but it is intended to show what kind of efforts are being undertaken.

GLOBAL BATTERY ALLIANCE

The most well-known battery passport projects are the piloting efforts made by the [Global Battery Alliance](#) (GBA).

In 2019, the GBA, together with the World Economic Forum, published a vision in 2019 on how to achieve a sustainable battery value chain in 2030. A battery passport was one of the key recommendations to create a circular value chain. "[A battery passport] could provide a powerful means to identify and track batteries throughout the life cycle and, hence, support the establishment of systems for life extension and end-of-life-treatment.", the report states. The GBA didn't sit on this recommendation, but is leading the effort to develop a prototype. On January 18th 2023, at the Annual Meeting of the World Economic Forum, the GBA presented the first proof-of-concept [pilots](#). The pilots tackled the technological question by showcasing two interoperable technical solutions to ensure data verifiability. The project also provided guidance on the content and definition and calculation question, by providing rulebooks on GHG-emissions, child labour and human rights.

The focus of these rulebooks was on the upstream part of the value chain, from raw material extraction to production, or in jargon: from cradle-to-gate. The GBA will continue its efforts to set standards for the entire battery value chain and create a seal of approval for passports that adhere to their methodology.

Despite its overall importance, the GBA efforts are not the only game in town. In the European context, one of the main ongoing projects is the Battery Pass project financed by the German Federal Ministry for Economic Affairs and Climate Action.

The German consortium partners works on a Proof of Concept for a workable battery passport which adheres to the European legislation. However, the outlook of the project does not stop at the German or European borders, as there is close collaboration with European and International partners, including the GBA. The Battery Pass project, for example, builds on the value chain approach by the GBA and is promoting the use of the rulebooks by the GBA. This aim for complementarity manifests itself clearly in the efforts by the Battery Pass activities on GHG-emissions. Where the GBA focused on the emissions form raw materials to production ("cradle-to-gate"), the Battery Pass is focusing more on the use phase and decommissioning/recycling ("gate-to-grave").

While the Battery Pass project has been made significant progress on these questions of defining the certain content aspects, the most impactful contribution so far has been in setting a standard for what content should be included in a battery passport. In April 2023, the Battery Pass project published their Content Guidance, which list which attributes should be stored in the passport to comply with the Battery Regulation, in which format they should be stored, and who should be able to access the data once stored. Like the GBA, the Battery Pass is highly collaborative and is also exchanging with two other projects with a different scope, but whose work content and data exchange will likely influence the future battery passport: CATENA-X and the CIRPASS project.

CATENA-X

The Catena-X project does not aim to develop a product passport as such, but it is aiming to develop a trusted data space for the automotive sector, which will allow for entities to track materials along the value chain and share data with collaborators, all the while keeping control over whom they share the data with. This way Catena-X is providing a blueprint for the last question mentioned in the introduction: who can access information and when. The keyword is data sovereignty, which applies to every stakeholder in the value chain who shares data, regardless of their size or role.

CIRPASS

The CIRPASS project, funded under Horizon 2020, has been doing preparatory work for the deployment of digital passport products more broadly, but has also looked at the content that will need to go into the battery passport.

CIRPASS will last for 18 months, wrapping up in 2024 and aims to create a clear concept for the DPP, defining a data model

which is applicable for different sectors and products. CIRPASS builds its result on broad stakeholder consultations. To this end, CIRPASS offers the possibility of interested stakeholders to reach out and join their consultations.

THE BATTERY PASSPORT IN OTHER HORIZON PROJECTS

Next to CIRPASS, several other ongoing projects under Horizon 2020 and Horizon Europe are also undertaking activities on the battery passport, albeit in a more focused way and linked to their main research topics.

BATRAW, FREE4LIB AND CUBER

The Horizon Europe BATRAW project is focusing on another aspect of the Battery Regulation, namely improving the use of recycled content. The project includes two pilot tests with electric vehicle batteries. These can be extended, depending on the results, to other types of batteries, including domestic batteries; to recover all the metals and materials contained in them. All key information captured during the BATRAW project will be made accessible to all stakeholders via a digital battery passport, stored on a blockchain solution offered by consortium partner Minespider.
The blockchain technology that Minespider has developed is also available as a standalone product on https://www.openbatterypassport.com/

Similarly, the Horizon Europe project FREE4LIB projects focuses on Li-ion battery recycling and re-manufacturing and aims to store all their data in a digital passport solution. The CUBER Horizon 2020-project is trying to look into the battery passport requirements for "batteries with external storage". This category from the Batteries Regulation refers to flow batteries.

Flow batteries will also have to implement a digital product passport, albeit later than other kind of batteries. However, flow battery stakeholders want to be involved in ongoing processes, in order to ensure that the current passports being developed can be applied to flow batteries as well. Otherwise, one would end up with two slightly different product passport standards for batteries with internal and external storage and a creating level playing field between both technologies on such a would be difficult.

HORIZON EUROPE

As part of the Horizon Europe Work Programme, the BATT4EU Partnership has introduced call HORIZON-CL5-2023-D2-02-03 to work on the Battery Passport. The call has the title "Creating a digital passport to track battery materials, optimize battery performance and life, validate recycling, and promote a new business model based on data sharing". The project foresees two pilot projects, building on actual use-cases and an exploration which business models can be developed across the value chain based on the data stored in the battery passport. However, the project is also expected to put research into calculation methodologies for key metrics. . As an open and interoperable passport is the main objective, the project outcomes are expected to be applicable to 3 or more use cases among the main transport or mobile applications and also be applicable to batteries used for stationary storage. The passport pilots will have to cover at least Li-ion batteries which are on, or close to, the market, but also be flexible enough to later be applied to batteries of other chemistries. The deadline for this call is on September 5, 2023.

A COLLABORATIVE ECOSYSTEM

One of the key takeaways is that the battery passport projects form an interwoven network working towards a common objective. They exchange information and build on each other's methodologies. One example of this collaborative spirit is the development of a common standard for a carbon footprint calculation. In the graphic below, the Battery Pass project lists the building blocks that have gone into the efforts to come to a uniform calculation of the carbon footprint, some of which we have covered in our descriptions above, others more specific on certain aspects. The graphic also shows that the Battery Pass project takes on board the work done by the GBA and does not want to reinvent the wheel.
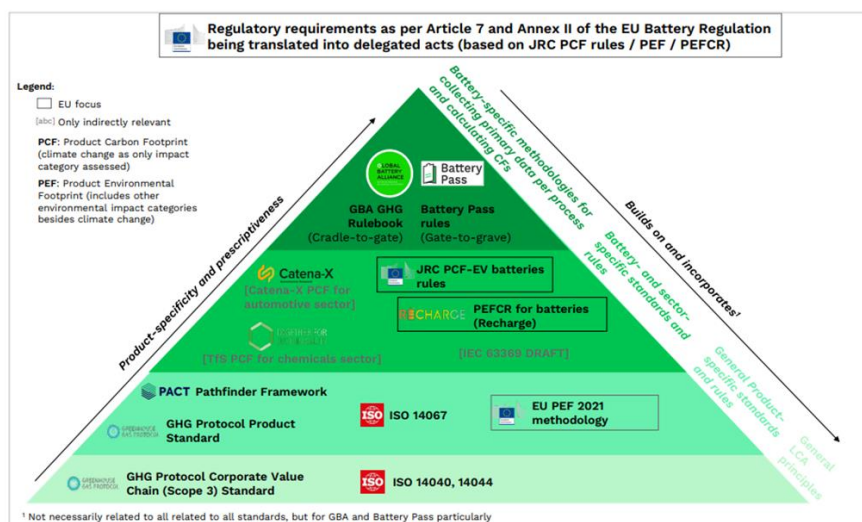

Figure 2 Source: Battery Pass Content Guide, page 87: Relevant standards and methodologies for the battery carbon footprint calculation

CONCLUSION

The implementation of a Digital Passport Product for the European battery value chain is a global first. This means that there Is a lot of research work to be done before its final implementation. Several funded projects are looking into, or will look into, the different questions that need be answered. Luckily, there is a spirit of open collaboration between them and a common aim to create a single overarching framework, rather than several different competing solutions. The BATT4EU Partnership will keep this topic in focus for the next years, supporting the different H2020 and Horizon Europe projects with their dissemination efforts. We will also be monitoring specific research needs that still might pop up and discuss with the European Commission and the BEPA members whether these topics warrant additional public funding.

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