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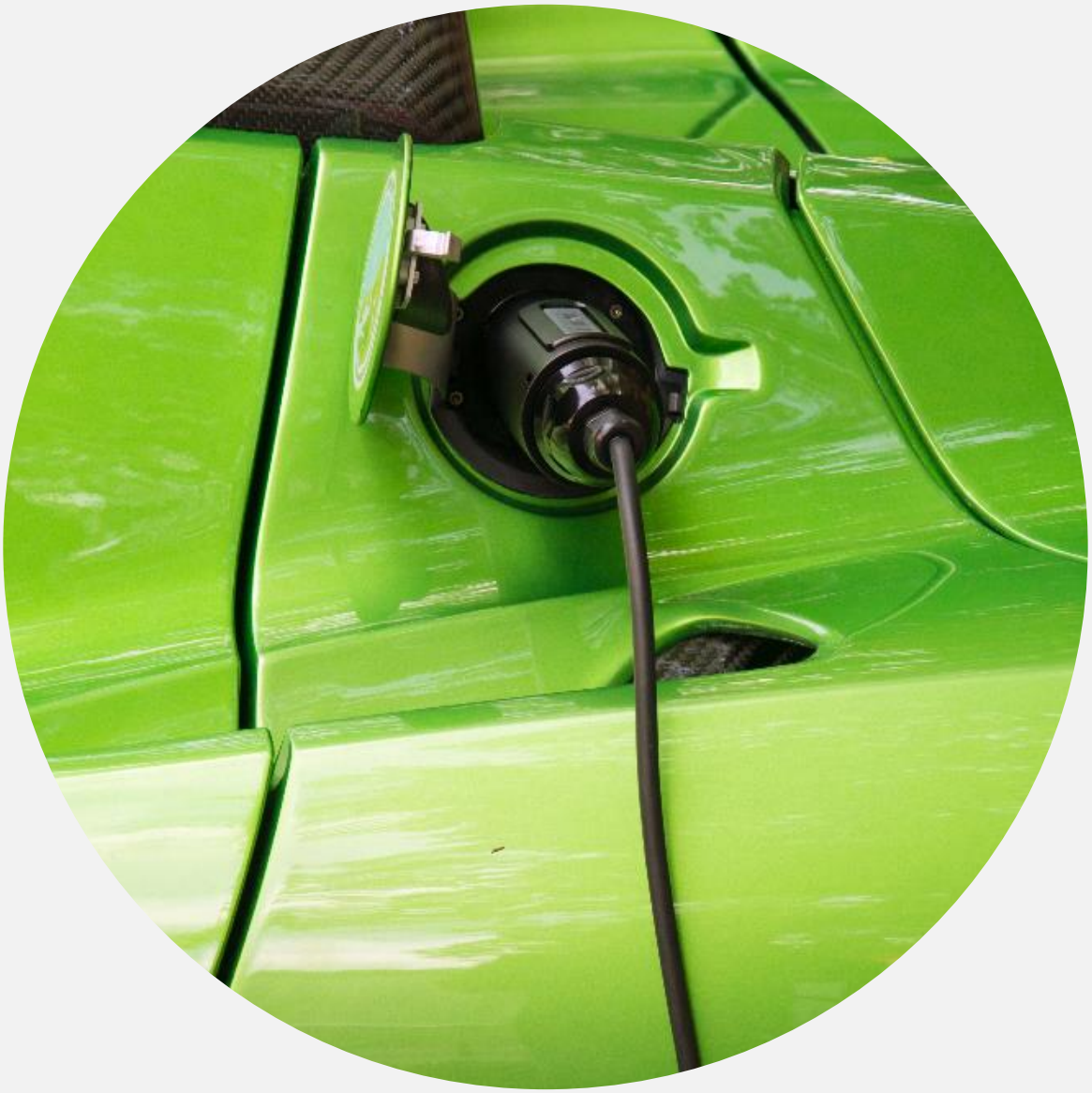
Car-Pass



October 2025

Research Assignment Battery SOH

Executive summary

Rapid growth of electric vehicles in Belgium, but the used car market is lagging behind

Electric vehicles are on the rise in Belgium. Between 2020 and 2024, the number of registrations of electric vehicles in Belgium increased by an average of 73% per year.

However, the breakthrough on the used car market is limited: in 2024, used electric vehicles only accounted for 3.34% of all newly registered used passenger cars in Belgium.

Source: FEBIAC

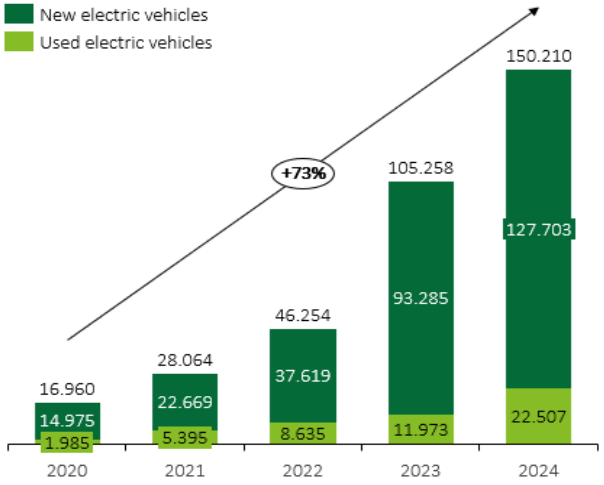


Figure: Number of registrations of electric vehicles in Belgium, period 2020-2024

The strong growth of electric vehicles in Belgium is mainly driven by leasing and commercial vehicles. In the coming years, this will lead to a rapid increase in supply on the used car market, as these vehicles move on after the end of their lease contract. **To develop the used car market sustainably, consumer trust is crucial. Unfortunately, many individuals are hesitant to purchase a used electric vehicle due to a variety of concerns:**

1. Purchase price

Private individuals in Belgium are mainly buyers of used vehicles on a budget, which means that electric vehicles are usually out of their reach. The high cost of a new battery (if necessary) is an additional obstacle.

2. Operational costs

Private individuals are often less aware of the relatively low operational costs of electric vehicles, such as charging costs and taxes. However, it's important to note that fast charging can be more expensive than a traditional refuelling.

3. Lifetime

Buyers of used electric vehicles are worried about battery life. Battery health depends in part on the original owner's charging and driving habits, which can affect the typical battery warranty of 160,000 km or 8 years.

4. Uncertainty around use

A key concern is the availability of charging options, both at home and on the go. Uncertainty about the range of electric vehicles and (fire) safety of batteries can play a role in the purchase decision.

The importance of State of Health (SOH) information

An important lever to reduce consumer reluctance is transparency about the state of health (SOH).

Degradation of an EV battery is an inevitable process that affects the storage capacity and performance of electric vehicles. Essentially, battery degradation means that over time, the battery loses its capacity to store a certain amount of energy and thus offers a reduced range.

Modern EV batteries degrade by an average of 1.8% per year under moderate conditions. This means that EV batteries have a lifespan of 10 to 15 years. Still, there is a chance that the EV battery will degrade much faster for a specific reason. To find out, we need to measure the overall state of health of the battery.

The State of Health (SOH) is a metric to measure the overall state of health of the battery.

Over time, the capacity of the battery usually decreases, resulting in a lower SOH. For example, if the current capacity of the battery is 90% of the original capacity, it means that the SOH is 90%.

The importance of SOH information is evident in several contexts:

- **Valuation upon sale:** A detailed SOH measurement can provide the potential buyer of a used electric vehicle with insight into the remaining battery capacity and expected battery life, helping to make an informed decision.
- **Maintenance:** SOH information provides valuable insights for battery health management, allowing timely maintenance to be performed and potential failures to be detected.
- **End of life:** SOH information helps us to determine whether the battery is suitable for reuse and repurposing, or whether it should be recycled.
- **Warranty management:** An accurate measurement of the SOH helps to determine if a battery is within the warranty conditions. This helps with fair warranty claims, prevents unnecessary replacements and increases consumer confidence.
- **...**

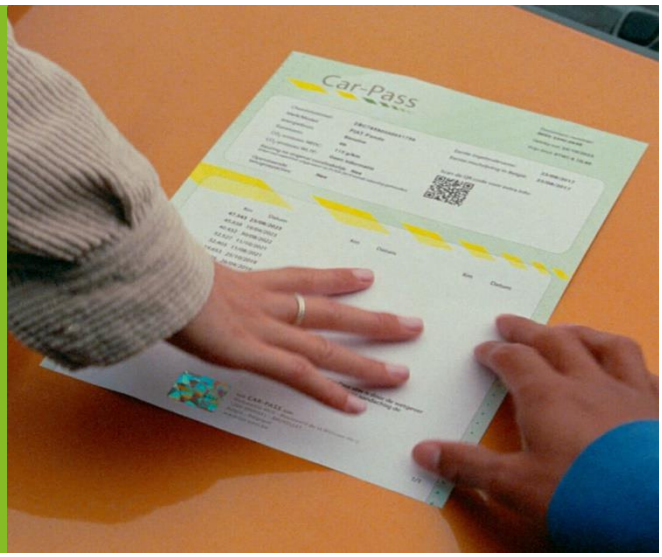
The SOH of EV batteries can be measured in a variety of ways. Independent basic tests provide quick insight by reading out the battery management system (BMS) via a dongle. The manufacturer can also accurately calculate the SOH by reading data from the BMS. Connected cars often offer real-time monitoring of the SOH via the dashboard or an app. Finally, for a more in-depth analysis, a full charge and discharge test can be performed.

Most importantly, the test method used must be reliable, consistent, and widely recognized, so that consumers and professionals can trust the outcome.

The potential role and added value of Car-Pass

Car-Pass has been a cornerstone of transparency and consumer protection on the Belgian used car market for years.

With millions of registered odometer readings and a legal basis, Car-Pass has proven its worth as an anti-fraud tool.



With the rise of electric vehicles, Car-Pass can further expand its role. Where the mileage used to be important, today the health of the battery is determining the value of a used electric vehicle. Owing to the existing legal basis, governance, (data) infrastructure and consumer trust, Car-Pass can become the trusted source of SOH information.

Recommendations for implementing SOH information on the Car-Pass

Listing SOH information on the Car-Pass is a necessary and strategic step to support the growing marked for used electric vehicles in Belgium. It can promote consumer protection and encourage sustainable mobility.

It is our recommendation to implement the integration of SOH information on the Car-Pass via a progressive approach. A progressive approach via a living lab is important because:

- Implementing the legal basis for including SOH on the Car-Pass takes time.
- Definitions and standards for SOH are still under development at European level.
- Operational adjustments to the Car-Pass system are required.

During the living lab phase, the mentioning of SOH on the Car-Pass may be optional. In the long term, however, we recommend a mandatory indication, with attention to:

- ✓ **Objective presentation of data:** The Car-Pass provides an objective representation of the relevant data, without any form of interpretation or assessment. The data is presented as it was measured or recorded. A general explanation of the information provided can be found on the Car-Pass website.
- ✓ **Transparency and traceability:** Each parameter listed must be traceable to a reliable source.
- ✓ **Reliable and recognized methods:** The methods used for calculating the SOH should be consistent, reliable, and widely recognized. This prevents sellers from using unreliable or unconventional methods to determine the SOH.
- ✓ **User-friendly presentation:** The data on the Car-Pass is presented in a clear and concise manner, without technical jargon. We offer interested parties the opportunity to consult additional information via a QR code.

- ✓ **Not only for BEVs, but also for PHEVs:** From a net battery capacity of 10 kWh, it is relevant to mention the SOH of Plug-In Hybrids (PHEVs) on the Car-Pass. Most PHEVs with such a capacity have an actual range of more than 50 kilometres. In this case, the state of health of the battery plays an important role in the purchase decision of the vehicle.

By following this progressive approach, SOH information is integrated in a high-quality and legal way, and Car-Pass can further expand its position as a reliable and innovative tool. In this way, we continue to evolve towards a sustainable, transparent and future-proof car market.

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